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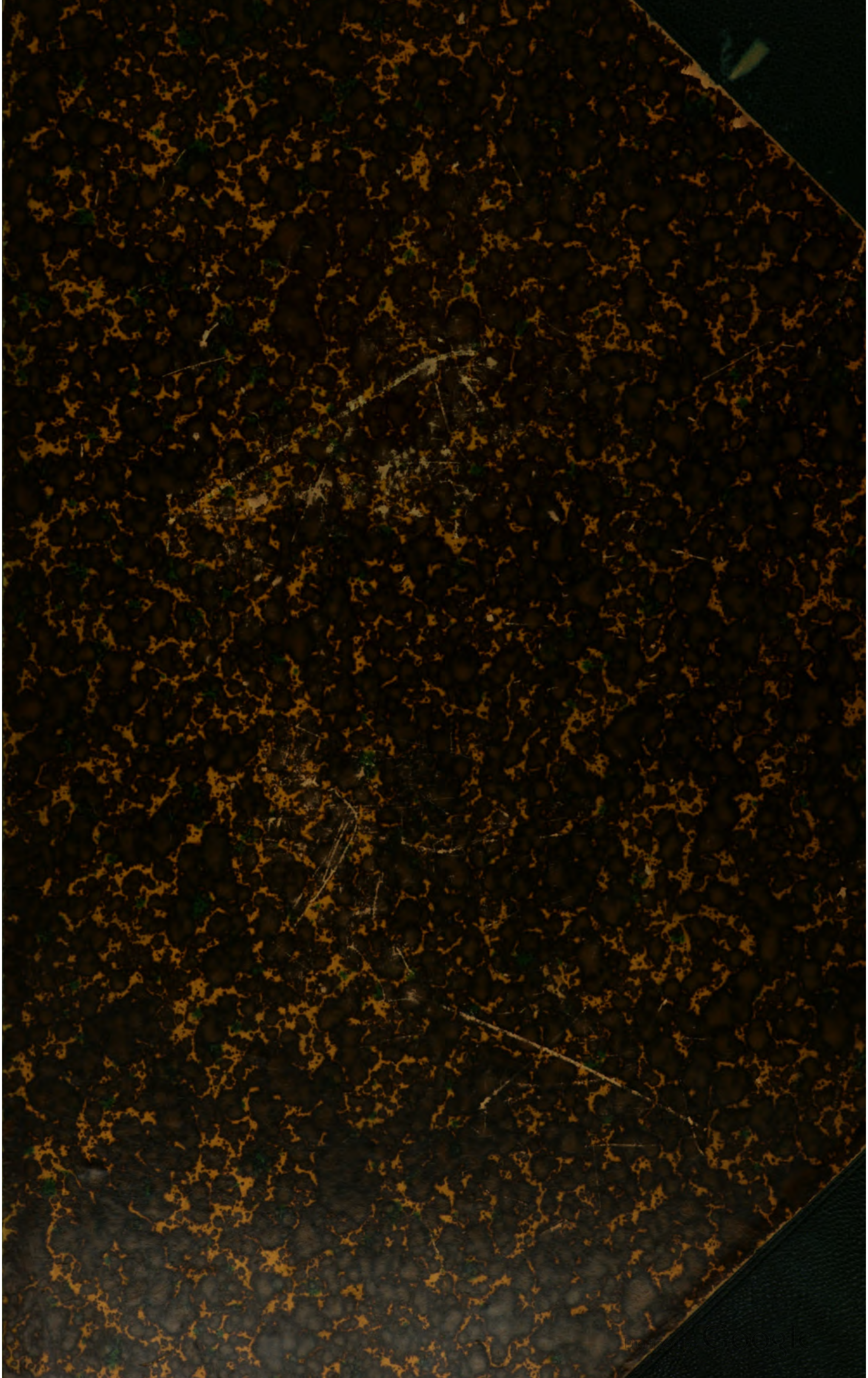

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AN ACCOUNT

OF THE

CRUSTACEA

OF

NORWAY

AN ACCOUNT
OF THE
CRUSTACEA
OF
NORWAY

WITH SHORT DESCRIPTIONS AND FIGURES OF ALL THE SPECIES

BY

G. O. SARS,
PROFESSOR AT THE UNIVERSITY OF CHRISTIANIA

VOL. II.
ISOPODA

BERGEN
PUBLISHED BY THE BERGEN MUSEUM
SOLD BY
ALB. CAMMERMEYERS FORLAG. CHRISTIANIA
1899

Oiled 7/1982 JS.

22 1/2

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BERGEN. JOHN GRIEG

PREFACE.

I have now the satisfaction of presenting to the scientific world the 2nd Volume of my work on the Crustacea of Norway.

The *Isopoda* have not yet been treated of as a whole by any of the Scandinavian zoologists, although of solitary groups there have recently been published several excellent monographs, especially by Danish zoologists. Thus the *Cymothoidæ* and *Ægidæ* have been treated of by Prof. Lütken and Meinert, the *Cirolanidæ* by Dr. Hansen, and the extensive group *Oniscoida* by Mr. Budde-Lund. In all these monographs, however, both indigenous and foreign forms are combined, and the present Volume is accordingly the first faunistic work on Scandinavian Isopoda. In as much as this is the case, I hope that it will be of practical use to future zoologists, who may enter upon a study of the indigenous Isopod-Fauna.

The plan according to which the work has been carried out, is chiefly that followed in the 1st Volume treating of the nearly-allied order *Amphipoda*. Of course, in so doing, some limits have presented themselves, beyond which the treating of the several forms could not pass, though in some instances, perhaps, a more detailed account would havs been desirable.

The difficulties connected with the elaboration of this work have been by no means small. I have especially taken great pains in investigating and critically determining the *Epicarida*, which undoubtedly is the most difficult of the Isopod groups, being at the same time of very prominent interest in biological respects. It is not improbable that some deficiencies and perhaps also errors may be found to exist in my account of this or the other groups; but considering the great difficulties connected with this investigation, I hope that they will be excused, and that they will soon be corrected by other zoologists. I may add, that the account especially of the Oniscoida and Epicarida would have been still much more defective, if I had not been assisted in a most ready manner by the directors of the

Copenhagen Museum, who have kindly placed at my disposal the rich collections of these groups procured during recent years by that Museum.

As to the systematic arrangement here adopted, some objections may perhaps be urged against its validity. I must, however, observe, that it is chiefly out of regard to the merely practical side of the question, that I have been induced to retain unaltered this arrangement, proposed by me several years ago, and now sanctioned by several distinguished authors.

In the Appendix to the Volume, some additions, chiefly as regards the geographical distribution of the species, are given, as also descriptions and figures of a few new species.

The plates, as in the 1st Volume, have been prepared by the autographic method, the appropriateness of which has been proved both by the plates of the 1st Volume, and by several other illustrations published by the present author. I am sorry, however, that some of the last plates of the present Volume have been less perfectly executed, owing to some want of care on the part of the lithographer in the transfer of my drawings. Yet I hope that these plates too will be found sufficiently distinct to allow of easily recognising the species illustrated.

In concluding this short preface, I wish in the first place to express my most hearty feeling of gratitude to my friend, the distinguished Danish zoologist, Dr. Hansen, for the kindness with which he has at all times assisted me, both by forwarding to me specimens from the Copenhagen Museum, and by giving me much useful advice and information. I am likewise indebted to Mr. Budde-Lund, the well-known author of the work on air-breathing Isopoda, for identifying some difficult forms of *Oniscoida*. There are also several other gentlemen to whom my thanks are due, partly for having sent me specimens, partly for having assisted me in other ways.

Finally, I beg to offer my best thanks to the direction of the Bergen Museum for the readiness with which it has undertaken the continued publication of this great work.

G. O. Sars.

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[1] It is of course not my intention to give here any complete account of the literature referring to the Isopoda, as such an account would fill several sheets; it is only my purpose to record some of the more important works, especially those referring to the northern fauna. The works are, as a rule, enumerated in chronological succession, and besides those treating of the Isopoda in general, some particular works are recorded for each of the chief groups, an arrangement which I hope may be of some practical use in facilitating reference.

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WITH SHORT DESCRIPTIONS AND FIGURES OF ALL THE SPECIES

BY

G. O. SARS

JA 1897

VOL. II.

ISOPODA

PART I. II.

APSEUDIDÆ, TANAIDÆ

BERGEN
PUBLISHED BY THE BERGEN MUSEUM
SOLD BY
ALB. CAMMERMEYER'S FORLAG, CHRISTIANIA
1896

JA . 1897

General Remarks.

The present order being rather nearly allied to that of the Amphipoda, a similar terminology may on the whole be applied to both. The body, which in most cases exhibits a more or less depressed, not as in the Amphipoda compressed, form, admits of being divided into 3 chief sections, viz., cephalon, mesosome and metasome, the urosome not being, as in the Amphipoda, defined as a particular division. In the group *Chelifera,* as also in the family *Gnathiidæ* among the *Flabellifera,* the cephalon is coalesced with the 1st segment of the mesosome, for which reason, in the said forms, this section may more properly be termed *cephalosome.* As to the several appendages, those of the cephalon are the same as in the Amphipoda, and are denominated in a similar manner. The 2 pairs of antennæ, it is true, are generally described as inner and outer, not as superior and inferior; but on a closer examination it may be easily proved, that in all forms the outer antennæ in reality issue beneath the inner. The 2 pairs of maxillæ, in the typical Isopoda, differ somewhat from those in the Amphipoda, the anterior ones being generally devoid of palp, whereas the posterior ones carry outside the outer lobe a lamellar appendage which ought to be regarded as a palp. The maxillipeds only exhibit a single pair of masticatory lobes, answering to the basal lobes in the Amphipoda. On the other hand they are provided outside with a more or less distinctly developed epignath, wholly wanting in the Amphipoda. In parasitic forms, as usual, the oral parts become more or less modified in their structure. The appendages of the mesosome, the legs, exhibit only in the terrestrial Isopoda (Oniscoidea) such a uniform appearance as to justify the name given to the order; but in by far the greater part of the Isopoda, the structure of the legs is rather diversified, in some cases (for instance in the Munnopsidæ) even more so than in the Amphipoda. The 1st pair generally differ conspicuously from the next succeeding ones, being prehensile and applied to the oral region, thus meriting the name of true gnathopoda, but in some instances the 2 succeeding pairs assume a similar prehensile nature (Ægidæ, Cirolanidæ, Idotheidæ). In the group *Chelifera*, the 1st pair of legs attain their greatest development, exhibiting the character of true chelipeds, as in the higher Crustacea. The number of legs is 7 pairs, as in the Amphipoda, with the one exception of the family *Gnathiidæ,* in which only 6 pairs are counted, the last pair being wholly absent. This, as is well known, is also the case with the young of all Isopoda, immediately after being hatched. The coxal plates to which the legs are appended, are far from being so distinct in the Isopoda as in the Amphipoda. In a great number of forms not even a trace of these plates is to be seen, and, when present, they are always so firmly connected with the corresponding segments, as scarcely to admit of being detached from them by dissection. In no case are branchial lamellæ found to be appended to these plates. The appendages of the metasome are, as a rule, 6 pairs, as in the Amphipoda. Of these the 5 anterior ones are in some instances natatory in character. But in the greater part of the Isopoda their function has changed to be more or less exclusively respiratory, and in such cases they lie densely crowded beneath the shield-like terminal portion of the metasome. In the group *Asellota* the 1st pair of these appendages are, as a rule, peculiarly modified, being in the female coalesced to a single thin opercular plate, covering the succeeding pairs, whereas in the male they are transformed into complicated copulative organs. Only the last pair can properly be termed uropoda. Their structure is rather variable in different Isopoda, affording excellent systematic characters. The telson is distinctly defined only in the *Anthuridæ.* In all other Isopoda it is fused with the preceding segment, and in some cases all the segments of the metasome are coalesced to a single shield-like plate, the so-called *urus.*

The systematic arrangement adopted in the present work is that proposed by the present author in 1882 (Oversigt af Norges Crustaceer I). I give below a Synopsis of the 6 Tribes into which the Isopoda, according to this arrangement, are divided, each tribe being defined by 3 characters, viz., those of the 1st pair of legs, the uropoda, and the pleopoda:

Legs of 1st pair	cheliform. Uropoda terminal. Pleopoda, when distinctly developed, exclusively natatory.			**1. Chelifera.**
	not cheliform.	Uropoda lateral,	forming together with the terminal segment of the metasome a caudal fan. Pleopoda for the most part natatory.	**2. Flabellifera.**
			valve-like, inflexed, arching over the pleopoda, which to a great extent are branchial.	**3. Valvifera.**
		Uropoda terminal.	Pleopoda exclusively branchial, generally covered by a thin opercular plate (the modified 1st pair.)	**4. Asellota.**
			Pleopoda fitted for air-breathing.	**5. Oniscoidea.**
			Pleopoda, when present, exclusively branchial in the adult animal, and not covered by any operculum.	**6. Epicarida.**

Tribe 1.

CHELIFERA.

Body generally slender, nearly cylindric in form. Cephalon and the 1st segment of mesosome coalesced, forming together a kind of carapace, which on each side contains a small branchial cavity. The 6 other segments of mesosome well defined, with the coxal plates small or inconspicuous. Metasome generally composed of 6 segments, the 5 anterior short, subequal, the last much the largest. Eyes distinct or wanting. Superior antennæ generally simple, sometimes, however, provided with a distinct secondary appendage; inferior ones smaller than the superior and issuing immediately beneath them. Mandibles with or without palps. Anterior maxillæ provided with a reflexed, setiferous palp; posterior ones very small, often quite rudimentary. Maxillipeds more or less coalesced at the base, and each having outside a membranous epignath projecting within the branchial cavity. 1st pair of legs very strong, curving anteriorly, and each terminating in a cheliform hand; 2nd pair sometimes unlike the succeeding ones, which are simple, ambulatory. Pleopoda, when present, comparatively small, natatory, rami lamelliform. Uropoda terminal, consisting of a short basal part and one or two terminal filaments. Sexual difference often very pronounced.

Remarks. — This is certainly a very anomalous group, differing, as it does, in certain particulars very markedly from the typical Isopoda, and exhibiting some points of resemblance to apparently widely distant crustacean orders, for instance the *Cumacea*. For this reason it has been proposed by some authors to remove this group altogether from the Isopoda, and to regard it as a distinct order. I do not find, however, that such an arrangement affords any real advantage, and as the present forms agree in many other respects with the Isopoda, I prefer to retain them within that order as an anomalous tribe. The most striking external feature is undoubtedly the peculiar modification of the 1st pair of legs, or the gnathopoda, into strong cheliform organs, a character not found in any other Isopoda, and somewhat recalling the higher Crustacea, crabs and lobsters. It is indeed from this character that the name of the group, chelifera, proposed by the author, has been derived. Another very anomalous feature is the complete fusion of the chephalon and the 1st segment of the mesosome, to form a kind of carapace, and the localisation of the respiration to that part, instead of, as in other Isopoda, to the metasome. In connection therewith is also the more anterior situation of the heart in the present forms. The group contains 2 distinct families, *Apseudidæ* and *Tanaidæ,* both represented in the fauna of Norway.

Fam. 1. Apseudidæ.

Body more or less elongated, tapering behind, and subdepressed in front, with the cephalosome rather broad and carinated laterally. Free segments of mesosome very sharply marked off, and exhibiting at the insertions of the legs, distinct, though small coxal plates. Metasome very narrow, composed of 6 well-defined segments. Eyes well-developed or rudimentary, being placed on distinctly defined lobes at the outer corners of the frontal margin. Superior antennæ issuing far apart, just beneath the ocular lobes, and consisting of a 3articulate peduncle and 2 unequal filiform flagella. Inferior antennæ much smaller than the superior, and sometimes having at the end of the peduncle a small squamiform appendage. Mandibles rather strong, each with a well-developed molar expansion and a triarticulate palp. Anterior maxillæ with 2 masticatory lobes, palp biarticulate and terminating in a number of slender setæ; posterior ones normally developed, though rather small. Epignath of maxillipeds rather large, forming a broad vaulted plate, terminating in a digitiform point. The 2 anterior pairs of legs unlike the others, and provided at the base with a small biarticulate exopodite; 1st pair distinctly cheliform and much instricted at the base, with the ischial joint obsolete; 2nd pair very powerful, fossorial in character, the outer joints being complanated and edged with strong spines. Pleopoda well developed and having the rami tipped with long natatory setæ. Uropoda biramous, rami filiform, multiarticulate, the inner one much the longer. Incubatory pouch normal.

Remarks. — This family is well distinguished from that of the *Tanaidæ* by the gradually tapering, and slightly depressed body, the greater development of the cephalosome, the peculiar structure of the antennæ and of the 2nd pair of legs, and the presence of a rudimentary exopodite at the base of the 2 anterior pairs of legs. In the structure of the oral parts also, several well-marked differences are to be found. Thus the mandibles are provided with distinct palps, always wanting in the *Tanaidæ*, and the maxillæ are more fully developed, the anterior ones having 2 masticatory lobes, and the posterior ones exhibiting all the parts characteristic of the typical Isopoda. Finally, the epignath of the maxillipeds is of an essentially different shape, and much more fully developed than in the *Tanaidæ*. The family contains as yet 5 genera, viz., *Apseudes* Leach, *Sphyrapus* Norm. & Stebb., *Parapseudes* G. O. Sars, *Typhlapseudes* Beddard, and *Leiopus* Beddard. Of these the 2 first-named genera are represented in the fauna of Norway.

Gen. 1. **Apseudes,** Leach, 1814.

Syn: *Eupheus*, Risso.
„ *Rhoëa*, M. Edw.

Generic Characters. — Body, as a rule, very slender and attenuated, with the segments generally sharply marked off from each other. Cephalosome rather broad, depressed, more or less distinctly sculptured above, and generally terminating in front in a flattened rostral plate. First free segment of mesosome rather firmly connected to the cephalosome, and having the coxal plates spiniform, pointing obliquely in front. Metasome very narrow, more or less hairy, with the terminal segment rather produced. Ocular lobes generally well-defined, with or without distinct eyes. Superior antennæ of similar structure in the two sexes, both flagella rather elongated. Inferior antennæ furnished at the end of the peduncle outside with a scale-like setous appendage. Mandibles rather strong, cutting part divided into 2 superposed dentated lamellæ and having behind a dense bunch of slender spines doubly or trebly forked at the tip, palp well developed and densely setous. Chelipeds in male larger than in female, with the hand more tumid and the thumb tuberculated inside. Fossorial legs rather strongly built and of similar structure in the two sexes. All the pleopoda distinctly developed, rami uniarticulate and clothed with long ciliated setæ. Uropoda with the rami very slender, filiform, being composed of numerous short articulations.

Remarks. — This is the first recorded genus, and may therefore be regarded as the type of the family. It is chiefly characterised from the next genus by the slender body, the flattened and distinctly sculptured cephalosome, the presence of a well-defined scale-like appendage to the inferior antennæ, and the less pronounced sexual differences, as regards the superior antennæ and the first 2 pairs of legs. The genus contains several species from different parts of the Oceans, amounting to about 14 in all. Only a single species is as yet found off the coast of Norway.

Apseudes spinosus, M. Sars.

(Pl. I & II.)

Rhoëa spinosa, M. Sars, Oversigt over de i den Norsk-arktiske Region forekommende Krebsdyr. Christiania Vid. Selsk. Forh. f. 1858, p. 30.

Syn: *Apseudes talpa,* Lilljeb. (not Mont.).

Specific Characters. — Body very slender and elongated, gradually tapering behind. Cephalosome distinctly areolated above, with a slight notch on each side in front of the middle, rostral plate cordiform, defined on each side by a distinct notch, and terminating in an acute, somewhat deflexed point. Ocular lobes well-defined, outer part slightly tumefied, and armed anteriorly with a short pointed prominence. Free segments of mesosome defined by deep constrictions, and having the upper face slightly tubercular. 1st pair of coxal plates of moderate size, spiniform, and pointing obliquely outwards, the others rather small and rounded. Antero-lateral corners of the 5 posterior segments produced to triangularly pointed, setiferous projections. Metasome very narrow, with the epimera of the 5 anterior segments produced to spiniform projections densely clothed with long ciliated bristles, terminal segment narrow and elongated, equalling in length the other 5 combined, subcylindrical in form and furnished laterally with numerous small setiferous nodules. Eyes imperfectly developed, with opaque whitish pigment and devoid of any distinct visual elements. Superior antennæ rather elongated, 1st joint of the peduncle attenuated distally and finely serrated in the proximal half of the inner edge, flagellum fully as long as the peduncle and 16—20-articulate, accessory appendage about half as long, and 8—9-articulate. Inferior antennæ with the flagellum longer than the peduncle. Chelipeds in female rather robust, scarcely smaller than the fossorial legs, basal joint fusiform, with a strong dentiform projection on the posterior edge beyond the middle, hand much larger than the carpus, oblong ovate in form, thumb with a distinct tubercle in the middle of the inner edge; those in male with the hand very large and tumid, both the thumb and the dactylus strongly tubercular inside. Uropoda very much elongated, attaining almost half the length of the body, inner ramus composed of about 30 articulations, outer ramus scarcely $^1/_3$ as long and 12-articulate. Colour whitish. Length reaching to 13 mm.

Remarks. — The present species was briefly described by my late father in the year 1858 as *Rhoëa spinosa,* but was subsequently, by most authors, identified with *Apseudes talpa* of Montagu. Having, however, been enabled to examine the latter species from Mediterranean specimens, I have convinced myself of its distinctness from the Norwegian form. The latter grows to a much larger size than the typical species, and has the body more strongly spinous, differing moreover very conspicuously in the rudimentary condition of the eyes, which in *A. talpa,* on the other hand is well developed, with dark pigment and distinctly defined visual elements.

Occurrence. — The species occurs along the whole coast of Norway, from the Christiania Fjord to Vadsö on a bottom consisting of loose muddy clay with gravel or stones intermingled, the depth ranging from 30 to 150 fathoms. It is a rather sluggish animal, concealing itself in the loose mud, so that at first it is not easily caught sight of. In many cases, moreover, it is found to be so thickly covered with mud adhering to the several spiniform projections of the body, and to the setæ issuing from them, that it is rather difficult to recognise. I have never seen it make any attempt to swim, though the structure of the pleopoda would seem to allow it, at least in a younger state, to move at times freely through the water.

Distribution. — Bohuslän (Lilljeborg); SSW of Ireland (Porcupine Expedition) in a depth of 725 fathoms (Norman & Stebbing).

Gen. 2. **Sphyrapus,** Norm. & Stebb., 1884.

Generic characters. — Body less elongated than in *Apseudes,* though somewhat more slender in male than in female. Cephalosome broadest behind and gradually narrowed in front, upper face vaulted and less distinctly areolated, frontal plate imperfectly defined at the base. Ocular lobes very small. First free segment of mesosome rather broad, and firmly connected with the cephalosome, but not coalesced with the same, coxal plates very small, not produced in the form of spines. Metasome not very much elongated, terminal segment comparatively short. Eyes wholly absent. Superior antennæ with the 1st joint of the peduncle rather large and flattened, accessory appendage small; flagellum in male with dense bunches of sensory filaments. Inferior antennæ very slender and without any scale-like appendage. Mandibles comparatively less strong than in *Apseudes*, palp very slender and only thinly setous. Chelipeds with the hand very large, submalleolate, being set on at right angles to the carpus, the latter, as also the meral joint, much more elongated in male than in female. Fossorial legs in male of extraordinary length. Pleopoda well-developed, with both rami biarticulate. Uropoda of moderate length, and of a similar structure to that in *Apseudes*.

Remarks. — This genus has been established by Messrs. Norman & Stebbing, to include some forms differing from *Apseudes,* among other things, in the absence of the scale-like appendage to the inferior antennæ. As another distinctive character, is mentioned the supposed fusion of the first 2 segments of the mesosome with the cephalon; but this, I believe, is not quite correct. For in the Norwegian species, at any rate, the 2nd segment is well defined from the cephalosome, though apparently rather firmly connected with it. As a third characteristic feature may be mentioned the very pronounced sexual difference occurring in this genus, both as to the general form of the body, and to the structure of the superior antennæ and the first 2 pairs of legs. The generic name refers to the peculiar malleolate appearance of the chelipeds, which, especially in the male, is very conspicuous. We know as yet of 4 species, 2 of which, *S. malleolus* and *S. tudes,* were procured during the Porcupine Expedition from very considerable depths, the greatest being 1460 fathoms, the 3rd, *S. serratus* G. O. Sars, likewise from great depths in the Arctic Ocean, the 4th a Norwegian form, to be described below.

Sphyrapus anomalus, G. O. Sars.

(Pl. III & IV.)

Apseudes anomalus, G. O. Sars, Undersøgelser over Christianiafjordens Dybvandsfauna, N. Mag. f. Naturvid. f. 1869, p. 45.

Specific Characters. — Body in female scarcely 5 times as long as it is broad, in male considerably more slender. Cephalosome with the upper face evenly vaulted and perfectly smooth, frontal plate broad, rounded, exserted at the end to a short, finely denticulated point. First free segment of mesosome somewhat broader than the cephalosome; the succeeding ones much narrower and defined by deep constrictions; last segment shorter than the others. Metasome perfectly smooth, with the epimera not at all produced, terminal segment occupying about $^1/_3$ of the length of the metasome and obtusely rounded at the tip. Superior antennæ in female about the length of the cephalosome, 1st joint of the peduncle gradually widening distally, with 4 strong setæ on the outer edge, last joint very small; flagellum scarcely half the length of the peduncle, and 5-articulate, accessory appendage about half its length, and 3-articulate; those in male rather larger, flagellum more fully developed, 7-articulate, and carrying dense fascicles of sensory filaments. Inferior antennæ fully as long as the superior, but much narrower, flagellum much shorter than the peduncle, and 4-articulate. Chelipeds in female rather strong, hand very large oblong oval, malleolate, exceeding in length the 2 preceding joints combined, fingers about the length of the palm and densely serrated inside. Chelipeds of male much more elongated, with the basal joint exceedingly large, and the meral joint greatly elongated and narrow. Fossorial legs in female longer than the chelipeds, and in male almost attaining the length of the whole body, the carpus being greatly elongated. Ambulatory legs narrow, and but scantily setiferous. Uropoda scarcely exceeding in length the metasome, inner ramus 10-articulate, outer rather small and 3-articulate. Colour a pure white. Length of female 4 mm., of male 5 mm.

Remarks. — The present form was first recorded by the author under the name of *Apseudes anomalus.* It certainly belongs, however, to the genus *Sphyrapus* subsequently established by Messrs. Norman and Stebbing. It is very nearly allied to the arctic species, *S. serratus,* described by the present author from the Norwegian North Atlantic Expedition, but may be at once distinguished by the fact that the epimera of the metasome are not, as in that species, acutely produced, but are simple and rounded.

Occurrence. — I have met with this form along the whole Norwegian coast from the Christiania Fjord to Vadsö. In the great fjords especially, it is often found in rather large numbers on a bottom consisting of muddy clay, the depth ranging from 100 to 400 fathoms. It is accordingly, like the other species of the genus, a true deep-water form, and resembles in habits the species of the genus *Apseudes.*

Distribution. — The Kara Sea (Hansen).

Fam. 2. Tanaidæ.

Body sublinear, cylindric, scarcely attenuated behind. Cephalosome not very broad, scarcely depressed, and having the front, as a rule, narrowly truncated; ocular lobes sometimes well defined, sometimes obsolete. Free segments of mesosome perfectly smooth, the middle ones being generally the longer; coxal plates inconspicuous. Metasome comparatively short, but scarcely narrower than the mesosome. Eyes present or wanting. Superior antennæ issuing close together from the frontal part, simple, in female comparatively short, conical and composed of only 3 or 4 articulations, in male, as a rule, much more fully developed, with a well-defined, multiarticulate flagellum. Inferior antennæ generally smaller than the superior, flagellum short, and, as a rule, only biarticulate. Mandibles of various structure in the several genera, but always without palps. Anterior maxillæ with only a single slender masticatory lobe; posterior ones quite rudimentary, forming simple rounded lobes. Maxillipeds coalesced at the base, epignath generally narrow, falciform. Chelipeds, as a rule, strongly built and closely applied to the oral area, issuing from the posterior part of the cephalosome with a broad base, carpus generally broad and compressed, hand sometimes rather dissimilar in the two sexes. Second pair of legs not very different from the succeeding ones, being rather small and ambulatory in character. Pleopoda, as a rule, very small, with the rami lamelliform and incurved, sometimes in female rudimentary or quite wanting. Uropoda not much elongated, simple or biramous.

Remarks. — This family may be easily distinguished from the preceding one, both as regards the outward appearance of the body, and the structure of the several appendages. It comprises rather a large number of genera, amounting to about 15 in all. These genera are chiefly characterised by the structure of the mandibles, partly also by that of the superior antennæ, the legs and the several appendages of the metasome. As to habits, the greater part of the species—perhaps all—seem to be tubicolar in character, constructing for themselves abodes of mud, into which they may wholly withdraw their bodies. They all, moreover, exhibit this peculiarity, namely, that on reaching the surface of the water, they remain floating, without being able to reimmerge their bodies, whereby the discovery of the generally very small and inconspicuous specimens is essentially facilitated. On placing some muddy clay taken from greater depths, in a shallow vessel, and stirring up the mud, they will very soon appear floating on the surface like small white pins, and may easily be taken up for a closer examination. To the Norwegian fauna belong 11 different genera, to be described below.

Gen. 1. **Tanais,** M.-Edw., 1829.

Syn. *Crossurus* Rathke.

Generic Characters. — Body not much elongated, but with the cephalosome rather tumid and provided with distinctly defined ocular lobes. Metasome only composed of 5 segments. Eyes well developed. Superior antennæ of similar structure in the two sexes, 3-articulate, with a very small knob-like terminal flagellum. Inferior antennæ a little smaller than the superior, with the flagellum 3—4-articulate. Mandibles rather strong, with the molar expansion well-developed. Palp of the anterior maxillæ biarticulate and provided at the tip with several slender setæ. Epignath of the maxillipeds more fully developed than in most other Tanaidæ, forming a semilunar, ciliated plate terminating in a digitiform lappet. Chelipeds very robust, especially in the male, hand in the latter much larger than in female, and having the fingers subforcipate. Second pair of legs slightly differing from the succeeding ones, the dactylus being very much elongated and setiform; dactyli of the other pairs strongly hooked, and in the 3 posterior pairs armed with comb-like teeth. Only 3 pairs of pleopoda present, all of them rather fully developed, with densely setiferous lamelliform rami. Uropoda simple, not much elongated, and composed of a limited number of articulations. Incubatory pouch formed by 2 lamellæ only, issuing from the base of the 5th pair of legs.

Remarks. — This is the first recorded genus, and from it, therefore, the whole family has been named. It is well distinguished from all the other genera, especially by the structure of the metasome and the limited number of pleopoda. The genus contains as yet 4 species, viz., *T. tomentosus* Kröyer, *T. Cavolini* M.-Edw., *T. Dulongi* M.-Edw. and *T. novæ-zealandiæ* Thomson. Only the first-named of these species occurs off the coasts of Norway.

Tanais tomentosus, Kröyer.

(Pl. V.)

Tanais tomentosus, Kröyer, Naturh. Tidsskr. Bd. IV, p. 183.

Syn: *Crossurus vittatus*, Rathke.
„ *Tanais vittatus*, Lilljeborg.
„ *Tanais hirticaudatus*, Sp. Bate.

Specific Characters. — Body of female about 5 times as long as it is broad, that of male somewhat shorter and thicker. Cephalosome rather tumid in its posterior part, and gradually narrowed anteriorly, frontal edge slightly angular in the middle. Free segments of mesosome defined by well-marked and rather deep constrictions, the 3 posterior ones being somewhat longer than the 3 anterior, and widening behind. Metasome fully as broad as the mesosome, but considerably narrowed in its posterior part, the 3 anterior segments being much the largest, and densely clothed laterally with stiff bristles, which on the 2 foremost ones are continued across the dorsal face in band-like fringes; 4th segment very small, terminal one scarcely broader, and subquadrangular in form. Eyes well developed, with dark pigment and distinct visual elements. Superior antennæ in female shorter than the cephalosome, and rather densely setiferous at the end of the joints, 1st joint about the length of the remaining joints combined, olfactory filaments 5 in number. Inferior antennæ but little shorter than the superior, though somewhat narrower. Chelipeds very strong, hand in female oblong oval and exceeding in length the carpus, both fingers provided inside with an obtuse tubercle; that in male considerably larger, with the fingers distinctly forcipate. 1st pair of pereiopoda longer than the others, dactylus biarticulate and subulate in shape; the succeeding ones with the carpal joint somewhat expanded and armed with several strong denticles, dactylus in the 3 posterior pairs very strong, hooked and armed inside in their outer part with comb-like denticles. Uropoda about the length of the last 2 segments of metasome combined, 3-articulate and rather densely setiferous, middle joint the longest, terminal joint rather short. Body whitish, variegated on the dorsal surface with a dark brownish pigment forming on the cephalosome a close reticulation, on the segments of mesosome, interrupted transversal bands. Length of adult female 5 mm., of male somewhat less.

Remarks. — This form has been recorded by Kröyer, as early as in 1842, under the above name, whereas Rathke's description of his *Crossurus vittatus* dates from the succeeding year. According to the rules of priority therefore, the specific name proposed by Kröyer ought to be preferred to that of Rathke. The *T. Cavolini* of M.-Edw. is very closely allied to the present species, and the only, in any way essential difference I have found in examining a single specimen of that species, is that the uropoda are 4-articulate instead of 3-articulate.

Occurrence. — Rathke found this form on oysters at Molde. It has subsequently been observed at Christiansund by v. Düben, and on the south coast by Örsted. My late father found it at Florö and Manger. I have myself observed it rather plentifully in a small bay at Korshavn, south of Bergen, where it occurred in quite shallow water among grass. At Haugesund, farther south, I have found it occasionally in weedy pools left by the tide.

Distribution. — Öresund (Kröyer), British Isles (Sp. Bate), Atlantic coast of North America (Harger).

Gen. 2. **Heterotanais,** G. O. Sars, 1880.

Generic Characters. — Body comparatively short and thick, slightly depressed, and exhibiting a rather different appearance in the two sexes. Metasome normally developed, with all 6 segments well defined. Eyes distinct, placed, as in

Tanais, on separate lobes. Superior antennæ in female short, triarticulate, with only a single terminal olfactory filament, in male more elongated, with the flagellum more or less developed. Mandibles rather strong, cutting edge in the left one consisting of 2 superposed dentated lamellæ, in the right mandible simple and finely serrated on the front edge, molar expansion in both mandibles large and thick. Palp of anterior maxillæ uniarticulate, terminating with 2 setæ only. Epignath of maxillipeds narrow falciform. Oral parts in male quite abortive. Chelipeds in female normal, in male very different, being imperfectly chelate, thumb very short, or transformed to a posteriorly-pointing lappet. 1st pair of pereiopoda longer than the others, with the dactylus setiform; the succeeding ones comparatively short and stout, with the dactylus simple. Pleopoda normal. Uropoda biramose, outer ramus very small, inner elongate, 4—5 articulate. Incubatory pouch normal.

Remarks. — This genus was established by the present author in 1880, to include *Tanais Örstedi* of Kröyer, which in some points differs rather markedly from the other Tanaidæ, though being most nearly allied to the genus *Leptochelia* of Dana. From the latter it differs chiefly in the very anomalous structure of the chelipeds in the male. Besides the typical form, another species has been described by the present author from the Mediterranean as *H. anomalus.* Moreover, the north American form *Leptochelia limicola* Harger, and the New Zealand species *Paratanais tenuis* Thomson, are most probably referable to this genus.

Heterotanais Örstedi, Kröyer.

(Pl. VI.)

Tanais Örstedi, Kröyer, Nat. Tidsskr. Bd. 4, p. 183.
Syn: *Tanais curculio* Kröyer ♂.
„ „ *balthicus* Fr. Müller ♀.
„ „ *rhynchites* Fr. Müller ♂.

Specific Characters. — Body about 5 times as long as it is broad, with the cephalosome in female of normal appearance, equalling in length the 3 succeeding segments combined, in male strongly produced and abruptly narrowed in front to a cylindrical neck, carrying on the tip the antennæ and eyes. Segments of mesosome much more densely crowded in male than in female. Metasome in male about half the length of the mesosome, in female scarcely longer than the last 2 segments combined, terminal segment comparatively short and obtusely rounded at the tip. Eyes of moderate size and same appearance in the two sexes. Superior antennæ in female shorter than the cephalosome, with the basal joint nearly twice as long as the other 2 combined, in male considerably more elongated, and composed of 5 articulations successively diminishing in size, the outer 2 representing the flagellum. Chelipeds in female of moderate size, hand oval, with the fingers comparatively short, the thumb having, inside, 3 serrations, the dactylus a single tubercle; those in male of enormous size, carpus very large and produced in front, outside the hand, to a lamellar lobe, hand imperfectly chelate, the thumb being transformed into a thin, reflexed lappet instricted at the base, dactylus long and falciform, with 3 small denticles inside. First pair of pereiopoda much larger than the others, the 3 posterior pairs more strongly built than the 2 preceding ones, with the basal joint rather tumid. Uropoda about half the length of the metasome, inner ramus 4-articulate, outer very small and biarticulate. Colour whitish. Length of adult female 2 mm., of male about the same.

Remarks. — The very pronounced sexual difference occurring in the present form has caused it to be twice described under 2 different names. Kröyer described the female as *Tanais Örstedi* and the male as *T. curculio*, and some years afterwards Fr. Müller, having apparently not been aware of Kröyer's description, recorded the same form under 2 different names, viz.: *Tanais balthicus* (the female) and *T. rhynchites* (the male). In this manner therefore, no less than 4 different names have been assigned to the same species. As Kröyer was the first to observe the species, one of his 2 specific names ought to be retained for the species, and more properly that by which the female was described. From the Mediterranean species, *H. anomalus,* the present form is easily distinguished by the very different aspect of the male.

Occurrence. — I have taken this form rather plentifully in the Iddefjord at Fredrikshald, where it occurred on a muddy bottom at a depth of 3—6 fathoms. Male specimens were, as usual, far less frequent than female ones, of which numerous specimens, both young and adult, were collected. Some specimens of this form are moreover contained in our University Museum, having been taken by the late Dr. Boeck from piles of the quay at Christiansand.

Distribution. — Öresund (Kröyer), Baltic at Landskrona and Westervik (Lilljeb.), Prussia at Greifswalde (Fr. Müller), Bohuslän (Lilljeb.).

Gen. 2. **Paratanais,** Dana, 1852.

Generic Characters. — Body of female linear, more or less elongated, of male much shorter and stouter. Cephalosome and metasome in both sexes normal. Eyes distinct, being much larger in male than in female, superior antennæ in female conical, 3-articulate, in male much more fully developed, consisting of a biarticulate peduncle and a well-defined 4-articulate flagellum densely clothed with sensory filaments. Mandibles well-developed and of a structure similar to that in the preceding genus. Oral parts in male, with the exception of the maxillipeds, abortive, epistome greatly produced. Chelipeds in both sexes normal and not very dissimilar, hand oblong oval, fingers comparatively short. Pereiopoda of moderate size, 1st pair slightly differing from the others, and having the dactylus setiform, the 3 posterior pairs much stronger than the 2 preceding pairs, though having the basal joint not much tumefied. Pleopoda all well developed, being comparatively larger in male than in female. Uropoda small, biramose, rami subequal and biarticulate. Incubatory pouch normal.

Remarks. — This genus was established in the year 1852 by Dana, to include a small Tanaid from the Sooloo Sea, *P. elongatus.* Several species have been subsequently adduced to this genus, but the greater part of them are in my opinion evidently generically distinct, and at the present time only a single additional species is to be noted, viz., the one described below. The genus is somewhat intermediate in character between the genera *Leptochelia* and *Typhlotanais,* though differing in some points rather markedly from both of them.

Paratanais Batei, G. O. Sars.

(Pl. VII.)

Paratanais Batei, G. O. Sars, Revision af Gruppen Isopoda chelifera, p. 32.
Syn: *Paratanais forcipatus,* Sp. Bate (not Lilljeb.)

Specific Characters. — Body of female about 5 times as long as it is broad, slightly tapering in front and behind, that of male much shorter and conspicuously constricted in the middle. Cephalosome in female gradually tapering anteriorly, with the frontal margin slightly angular in the middle; that of male not having the anterior part prolonged; ocular lobes in both sexes imperfectly defined. Metasome in female scarcely as broad as the mesosome and furnished laterally with scattered hairs, terminal segment about the length of the 2 preceding ones combined, and evenly rounded at the tip. Eyes in female comparatively small, though distinct, in male very large, oval, with numerous refracting corneæ. Superior antennæ in female shorter than the cephalosome, basal joint somewhat exceeding in length the other 2 combined, terminal joint longer than the penultimate one; those in male attaining almost 1/3 of the length of the body, 1st joint of the flagellum very short, discoidal and, like the 2 succeeding joints, having a dense bunch of olfactory filaments. Chelipeds in female somewhat tapering distally, hand a little longer than the carpus, and oblong oval in form, with the fingers much shorter than the palm; those in male slightly differing, the hand being conspicuously dilated in the middle. Uropoda about the length of the last 2 segments of metasome combined, outer ramus a little shorter and narrower than the inner, joints of the rami of equal length. Length of adult female 1.60 mm., of male 0.90 mm.

Remarks. — This form was first recorded by Sp. Bate, but was erroneously identified by him with *Tanais forcipatus* Lilljeborg, which belongs to a very different genus. It was therefore necessary to change the specific name, and in 1880 I proposed for the species the name of *P. Batei.* From the type species, *P. elongatus* Dana, it is easily distinguished by its much less slender form, the male especially exhibiting quite an unusually short and thick body.

Occurrence. — I have met with this form in several places on the west coast of Norway, in comparatively shallow water among the roots of Laminariæ. The males, as usual, are far less numerous than the females and, on the whole, look so very different, that they may easily be mistaken for quite a different species. As however, they, were found in company with the females, and no other Tanaid occurred in these places, their true relation could with certainty be affirmed.

Distribution.—British Isles (Sp. Bate), Mediterranean at Spezia (the author).

Gen. 3. Typhlotanais, G. O. Sars, 1880.

Generic Characters. — Body in female more or less elongated, sub-depressed, linear, with the lateral contours almost straight; that of male comparatively shorter and constricted in the middle. Cephalosome of moderate size, narrowly truncated in front, or slightly produced in the middle, with no traces of ocular lobes. 1st free segment of mesosome generally much shorter than the others. Metasome normal. Eyes wholly absent. Superior antennæ in female conically attenuated, 3-articulate, with the middle joint small, the terminal one narrow and elongated; those in male much larger and of a similar structure to that in the genus *Paratanais*. Inferior antennæ, as a rule, rather narrow, with the 2nd joint more or less dilated. Mandibles well-developed, cutting edge obscurely dentated and provided on the left mandible with a distinct secondary lamella, molar expansion cylindric, straight, and slightly dilated at the tip, which is transversely truncated, and surrounded with dentiform tubercles. Oral parts in male, excepting the maxillipeds, abortive; epistome prominent, globular. Chelipeds in female less robust, generally attenuated distally, with the hand comparatively narrow, and the fingers simple; those in male but slightly different. 1st pair of pereiopoda, as a rule, longer than the second, with the dactylus setiform; the succeeding ones comparatively short, basal joint of the 3 posterior pairs generally strongly tumefied. Pleopoda normally developed and larger in male than in female. Uropoda short, biramose, both rami biarticulate, or one of them uniarticulate. Incubatory pouch normal.

Remarks. — This genus is chiefly distinguished from the preceding ones by the total absence of eyes and ocular lobes, as also by the somewhat different structure of the mandibles. Moreover the subulate form of the superior antennæ in the female, and the narrowness of the hand of the chelipeds may serve as recognizing marks. The genus contains rather a large number of species, which all are true deep-water forms, and pronouncedly tubicolar, constructing small cylindric tubes of mud-particles agglutinated together. No less than 9 different species occur off the coast of Norway, and will be described below. Moreover the present author has recorded a Mediterranean species, *T. messinensis,* and 2 additional species, *T. kerguelensis* and *T. brachyurus* have been described by Mr. F. Beddard from the Challenger Expedition.

1. Typhlotanais tenuimanus (Lilljeb.).

(Pl. VIII, fig 1.)

Tanais tenuimanus, Lilljeborg, Bidrag till Kännedomen om de inom Sverige och Norrige förekommande Crustaceerne af Tanaidernes familj, p. 15.

Specific Characters. — ♀. Body more than 6 times as long as it is broad, with the segments only separated by very narrow constrictions. Cephalosome rather large, much longer than it is broad, and gradually attenuated in front. 1st free segment of mesosome much shorter than the others, the 4 succeeding ones subequal, rectangular, last one somewhat shorter. Metasome slightly dilated in the middle, with the terminal segment about the length of the 2 preceding ones combined. Superior antennæ but little shorter than the cephalosome, subulate, terminal joint much elongated and narrow, almost attaining the length of the basal one. Inferior antennæ with the 2nd joint of the peduncle considerably dilated. Chelipeds much attenuated, hand very narrow, and not nearly attaining the length of the carpus, fingers shorter than the palm. 1st pair of pereiopoda longer than the others; the 2 succeeding pairs comparatively robust, with the meral joint dilated distally, triangular in form, and carrying inside a strong spine; the 3 posterior pairs likewise strongly built, with the basal joint much tumefied, and the 2 outer joints minutely serrulate on the inner edge. Uropoda attaining half the length of the metasome, both rami biarticulate and rather narrow, especially the outer one, which scarcely exceeds in length the basal joint of the inner, and has its terminal joint about twice the length of the basal one. Length reaching to 4.20 mm.

Remarks. — This is the largest and finest species of the genus, and may, moreover, easily be recognized by the strongly attenuated chelipeds and the structure of the uropoda. It may be regarded as the type of the genus.

Occurrence. — I have met with this beautiful form in numerous places on the Norwegian coast, from the Christiania Fjord up to the Lofoten Isles, in depths ranging from 50 to 300 fathoms. In some places, for instance in the Christiania Fjord south of Dröbak, it occurs in considerable numbers on a bottom of loose muddy clay, covered with decaying Zostera. The specimens examined by Prof. Lilljeborg were procured at Molde. Out of Norway, it has not yet been recorded.

2. Typhlotanais microcheles, G. O. Sars.

(Pl. VIII, fig. 2.)

Typhlotanais microchêles, G. O. Sars, l. c. p. 38.

Specific Characters. — ♀. Body somewhat more slender than in the preceding species, being about 7 times as long as it is broad, and having the segments more sharply marked off from each other. Cephalosome gradually attenuated anteriorly, frontal margin acutely produced in the middle. First free segment of mesosome rather short and somewhat widening in front; the remaining segments subquadrate in outline. Metasome scarcely broader than the mesosome, and having the terminal segment rather short. Superior antennæ comparatively short, but little exceeding half the length of the cephalosome, conical in form, basal joint longer than the other 2 combined, terminal joint produced at the tip to a somewhat inward-pointing denticle. Inferior antennæ with the 2nd joint of the peduncle less dilated than in the preceding species. Chelipeds rather poorly developed, hand unusually small and narrow, with the fingers about the length of the palm. 1st pair of pereiopoda not very different from the 2 succeeding pairs, though with the dactylus more produced. The 3 posterior pairs less robust than in *T. tenuimanus*, with the basal joint less tumid, and the 3 outer joints each armed inside with a strong denticle. Uropoda about half the length of the metasome, rami very narrow and unequal, the inner biarticulate, the outer uniarticulate and scarcely more than half as long. Length 2.70 mm.

Remarks. — This species is nearly allied to *T. tenuimanus*, though easily distinguishable by several well-marked differences, for instance, the acutely produced frontal margin, the comparatively short superior antennæ, the unusually poor development of the chelipeds, and the structure of the uropoda.

Occurrence. — Only a few female specimens of this form have hitherto been found by me. These were collected in two widely-distant localities, viz., at Bekkervig, on the west coast of Norway, and at Kvalö on the Nordland coast, the depths being 60—100 fathoms.

3. Typhlotanais finmarchicus, G. O. Sars.

(Pl. IX.)

Typhlotanais finmarchicus, G. O. Sars, l. c. p. 36.

Specific Characters. — Body in female sublinear, depressed, about 6 times as long as it is broad, with the segments only separated by narrow constrictions; that of male less elongated, with the segments more sharply marked off from each other. Cephalosome in female almost as broad as it is long, with the side-contours evenly arcuate; that in male considerably more narrowed in front. 1st free segment of mesosome in female about same size as the last one, the 4 middle ones considerably larger and rectangular. Metasome in female of nearly equal breadth throughout, in male much more fully developed, subfusiform and occupying $^1/_3$ of the length of the body. Superior antennæ in female scarcely attaining the length of the cephalosome, basal joint almost twice as long as the other 2 combined; those in male modified in the usual manner, basal joint very large and laminar, slightly widening distally. Chelipeds in female of moderate size, hand slightly dilated in the middle and nearly as long as the carpus, fingers about the length of the palm; those in male somewhat more feeble, with the hand narrower and provided inside the insertion of the dactylus with a transverse row of about 5 setæ. 1st pair of pereiopoda a little longer than the succeeding pairs, and having the dactylus more produced; the 3 posterior pairs moderately strong, with the basal joint not much tumefied, and the carpal joint forming a smooth, rounded prominence at the end inside. Pereiopoda in male comparatively more slender than in female. Uropoda rather short, scarcely exceeding $^1/_3$ of the length of the metasome, both rami distinctly biarticulate, the outer one shorter and much narrower than the inner, both articulations equal in size. Body in female whitish, semipellucid, each of the segments of the mesosome having 2 irregular, juxtaposed patches of a light yellowish colour derived from some opaque matter lying inside the skin; that of male slightly variegated with a pale brownish pigment. Length of female 2.00 mm., of male 1.50 mm.

Remarks. — This form, at first sight, looks rather like *T. æquiremis* Lilljeborg, to be described below, but is found, on a closer examination, to differ in the structure of the superior antennæ, the posterior pairs of pereiopoda, and the uropoda. It is also rather inferior in size.

Occurrence. — I found this species, many years ago, rather plentifully in the harbour of Vadsö at a depth of 30 fathoms. Male specimens occurred not infrequently together with the females, and could of course with perfect certainty be referred to this species. Otherwise it is a matter of great difficulty to refer male specimens to their respective species, not only because they differ very markedly from the females, but because they exhibit a perplexing mutual similarity.

4. Typhlotanais æqviremis (Lilljeborg).

(Pl. X, fig. 1).

Tanais æqviremis, Lilljeborg, l. c. p. 21.
Syn: *Tanais depressus*, G. O. Sars (olim).

Specific Characters. — ♀. Body linear, more than 6 times as long as it is broad, and pronouncedly depressed, with the cephalosome rather short, but little longer than it is broad. First free segment of mesosome shorter than the others, which are rectangular in form. Metasome scarcely longer than the last 2 segments of mesosome combined, and of equal breadth throughout, terminal segment comparatively short, and obtusely truncated at the tip. Superior antennæ about the length of the cephalosome, conically tapering, basal joint somewhat longer than the other 2 combined. Chelipeds comparatively strong, hand larger than usual, attaining the length of the carpus, and oblong oval in form, fingers about the length of the palm. 1st pair of pereiopoda considerably longer than the 2 succeeding ones, which are rather small; the 3 posterior pairs very robust, with the basal joint exceedingly tumefied, and the carpal joint quite smooth, not produced inside. Uropoda very short, but little longer than the terminal segment of the metasome, rami subequal in length, the outer one distinctly biarticulate and terminating in a rather strong seta, inner ramus uniarticulate, though sometimes with a very slight indication of a subdivision beyond the middle. Length 3.10 mm.

Remarks. — This form was first recorded by the present author as a new species under the name of *Tanais depressus.* I have, however, subsequently convinced myself that in reality it is identical with the form described by Prof. Lilljeborg at an earlier date, as *Tanais æqviremis.* The species may be recognized by the pronouncedly depressed form of the body, the comparatively strong chelipeds and the structure of the uropoda. Prof. Lilljeborg states that both rami of the latter are biarticulate, but the inner one does not in fact exhibit any distinct subdivision, and may more properly be said to be uniarticulate.

Occurrence. — The species is rather common along the whole south and west coasts of Norway, in depths ranging from 30 to 100 fathoms. It extends northwards to the Lofoten Isles.

Distribution. — Bohuslän (Lilljeb.)

5. Typhlotanais assimilis, G. O. Sars.

(Pl. X, fig. 2).

Typhlotanais assimilis, G. O. Sars, l. c. p. 36.

Specific Characters. — ♀. Body rather slender, linear, subdepressed, about 7 times as long as it is broad, with the cephalosome comparatively large, exceeding in length the 2 anterior segments of the mesosome combined, and but slightly narrowed in front. 1st free segment of mesosome considerably shorter than the others, which are rectangular in shape. Metasome longer than the last 2 segments of mesosome combined, terminal segment about the length of the 2 preceding ones taken together, and obtusely produced at the tip. Superior antennæ rather elongated, conically tapering, with the basal joint but little longer than the other 2 combined, terminal joint long and narrow. Inferior antennæ with the 2nd joint of the peduncle rather expanded and finely serrated on the upper edge. Chelipeds not nearly so strong as in *T. æqviremis,* and attenuated distally, hand about the length of the carpus, but much narrower, fingers shorter than the palm. 1st pair of pereiopoda much longer than the 2 succeeding ones, which are very small, with the propodal joint oblong oval in form and somewhat compressed; the 3 posterior pairs resembling in structure those in *T. æqviremis,* though having the basal joint less tumefied. Uropoda somewhat longer than the last segment of the metasome, both rami distinctly biarticulate and rather unequal, the outer one being much shorter than the inner, though scarcely narrower. Length 1.70 mm.

Remarks. — The present species is nearly allied to *T. æqviremis,* but easily distinguishable by the comparatively larger size of both the cephalosome and the metasome, as also by the much less strong chelipeds, and the somewhat different structure of the uropoda. It is also very inferior in size.

Occurrence. — I have found this form occasionally in several places, both on the south and west coasts of Norway, in depths ranging from 50 to 150 fathoms. The most northern place where I have met with it, is Kvalö on the Nordland coast.

6. **Typhlotanais tenuicornis,** G. O. Sars.

(Pl. X, fig. 3).

Typhlotanais tenuicornis, G. O. Sars, l. c. p. 37.

Specific Characters. — ♀. Body very slender and elongated, more than 8 times as long as it is broad, with the cephalosome shorter than the first 2 segments of mesosome combined, and slightly narrowed in front. 1st free segment of mesosome a little shorter than the last one, the others regularly quadrate, being fully as long as they are broad. Metasome shorter than the last 2 segments of mesosome combined. Superior antennæ attaining the length of the cephalosome, unusually narrow, with the basal joint longer than the other 2 combined. Inferior antennæ, with the 3rd joint of the peduncle armed below with 2 recurved denticles. Chelipeds of moderate size, hand rather elongated, exceeding in length the carpus, fingers about the length of the palm. The first 3 pairs of pereiopoda rather slender, and each having a long and slender seta springing off from the ischial joint; the 3 posterior pairs much more strongly built, with the basal joint rather tumefied, and the carpal joint forming inside a rounded expansion. Uropoda very short, both rami uniarticulate, linear, unequal, the inner one being almost twice as long as the outer. Length 1.75 mm.

Remarks. — This form may be at once recognized by the unusually narrow superior antennæ, and the long seta springing off from the ischial joint of the 3 anterior pairs of pereiopoda, as also by the structure of the uropoda.

Occurrence. — I have met with this species in 3 different localities of the Norwegian coast, lying rather widely distant from each other, viz., in Eidsfjord west of Listerland, at Bekkervig south of Bergen, and at Kvalö on the Nordland coast, the depth ranging from 60 to 120 fathoms.

7. **Typhlotanais brevicornis** (Lilljeb.)

(Pl. XI, fig. 1).

Tanais brevicornis, Lilljeborg, l. c. p. 15.

Specific Characters. — ♀. Body extremely slender and narrow, about 9 times as long as it is broad, with the cephalosome gradually tapering in front. 1st free segment of mesosome longer than the last one, and not much shorter than those immediately succeeding it. Metasome about the length of the last 2 segments of mesosome combined, terminal segment evenly rounded at the tip. Superior antennæ rather short, scarcely more than half as long as the cephalosome, basal joint much longer than the other 2 combined. Chelipeds of moderate size, hand oblong in form and somewhat shorter than the carpus, fingers about the length of the palm. 1st pair of pereiopoda considerably longer than the others, the 3 posterior pairs rather short, with the basal joint not much tumefied. Uropoda scarcely longer than the terminal segment of metasome, rami very unequal, the outer one extremely small and uniarticulate, pointing generally straight outwards, inner ramus more than twice as long, and distinctly biarticulate. Length 1.60 mm.

Remarks. — The present species, established by Prof. Lilljeborg, is easily recognized by the very slender and narrow body, the comparatively short superior antennæ, and the structure of the uropoda.

Occurrence. — I have met with this species not infrequently in several places both on the south and west coasts of Norway, in depths ranging from 60 to 150 fathoms. It extends northwards to Kvalö on the Nordland coast.

Distribution. — Coast of Denmark (Meinert).

8. Typhlotanais cornutus, G. O. Sars.

(Pl. XI, fig. 2).

Paratanais cornutus, G. O. Sars, Crustacea & Pycnogonida nova in itinere 2do et 3tio Expeditionis Norvegicæ anno 1877 & 78 collecta, No. 5.

Specific Characters. — ♀. Body comparatively short and thick, depressed, about 4½ times as long as it is broad, with the cephalosome rather broad in proportion to its length, and evenly convex on each side, frontal margin produced in the middle to an acute rostriform projection. 1st free segment of mesosome very short, the others more than twice as broad as they are long, and separated by narrow constrictions. Metasome considerably longer than the last 2 segments of mesosome combined, and slightly narrowed in its distal part. Superior antennæ about the length of the cephalosome, conically tapering, basal joint somewhat longer than the other 2 combined, terminal joint rather narrow and tipped by slender bristles. Chelipeds of moderate size, and somewhat attenuated distally, hand scarcely attaining the length of the carpus, and oblong oval in form, fingers shorter than the palm. 1st pair of pereiopoda, as usual, longer than the 2 succeeding pairs, basal joint of the 3 posterior pairs rather tumid. Uropoda equalling in length about $^1/_3$ of the metasome, both rami distinctly biarticulate and somewhat unequal, the outer one being shorter and narrower than the inner. Length 1.65 mm.

Remarks. — This form was discovered during the Norwegian North Atlantic Expedition, and has been described and figured in detail by the present author in the Report of the Crustacea from that Expedition. It is easily distinguished from any of the previously described species by its comparatively short and thick body, the acutely produced frontal margin, and the comparatively long bristles issuing from the tip af the superior antennæ.

Occurrence. — A few female specimens of this form have been taken by me at Kvalö on the Nordland coast, from depths of 60—100 fathoms.

Distribution. — Stat. 290 of the Norwegian North Atlantic Expedition, lying W. of Finmark.

9. Typhlotanais penicillatus, G. O. Sars.

(Pl. XI, fig. 3.)

Typhlotanais penicillatus, G. O. Sars, l. c. p. 39.

Specific Characters. — ♀. Body a little more slender than in *T. cornutus,* being almost 5 times as long as it is broad. Cephalosome not nearly so broad as in the said species, and having the frontal edge less strongly produced in the middle. First and last segment of mesosome of about same size and somewhat shorter than the others, which are separated by rather conspicuous constrictions. Metasome of almost uniform breadth throughout. Superior antennæ extremely slender and narrow, considerably exceeding in length the cephalosome, terminal joint linear and tipped by slender bristles, one of which is of quite an unusual length. Chelipeds slender and feeble, hand very narrow, sublinear, exceeding in length the carpus, fingers nearly as long as the palm. Pereiopoda resembling in structure those in *T. cornutus,* basal joint of the 3 posterior pairs, however, less tumid. Uropoda with the inner ramus distinctly biarticulate, the outer one uniarticulate and somewhat shorter. Length 1.40 mm.

Remarks. — This species is nearly allied to *T. cornutus,* but is of somewhat more slender form, and moreover easily distinguished by the much feebler structure of the chelipeds, and by the extremely slender superior antennæ, with their long terminal pencils of bristles. Also the uropoda differ essentially in the fact of the outer ramus being uniarticulate.

Occurrence. — Only 2 female specimens of this form have hithertho been taken by me. They were collected at Sauesund, west coast of Norway, from depths of 50 to 100 fathoms.

Gen. 4. **Leptognathia,** G. O. Sars, 1880.

Generic Characters. — Body in female, as a rule, narrow and elongated, subcylindrical, with the segments marked off by marked constrictions; that of male much shorter and stouter. Cephalosome generally narrowed only in its most anterior part, and having the front narrowly truncated. Metasome with all its segments well defined, being much more fully developed in male than in female. Eyes wholly absent. Superior antennæ in female distinctly 4-articulate, 1st joint the largest, in male much more fully developed, composed of a 3-articulate peduncle and a well-defined, 4-articulate flagellum densely clothed with sensory filaments. Mandibles very small and feeble in structure, cutting part narrow, molar expansion forming a thin acuminate lappet armed at the tip with a few small denticles. Oral parts in male, excepting the maxillipeds, abortive, epistome forming a rounded projecting lobe. Chelipeds in female of normal appearance, with the hand more or less expanded, thumb generally serrated inside; those in male feebler in structure, with the hand narrower, and the fingers quite simple. 1st pair of pereiopoda not very different from the 2 succeeding pairs, the 3 posterior pairs generally more strongly built, and having the outer joints armed with spines. Pleopoda in female rather small, sometimes wanting; those in male well-developed. Uropoda, as a rule, biramous, sometimes, however, apparently simple, the outer ramus not being distinctly defined from the basal part, rami always very unequal, the inner one much the larger and biarticulate, the outer with either one or two articulations. Incubatory pouch normal.

Remarks. — This genus is chiefly characterised by the feeble structure of the mandibles. From the preceding genera it may moreover be at once distinguished by the superior antennæ in the female being distinctly 4-articulate, not as in the former 3-articulate. The genus comprises numerous species, which on the whole are true deep-water forms and tubicolar in habits. Besides the 6 Norwegian species described below, the arctic form *Tanais gracilis* Kröyer, as also *Tanais graciloides* Lilljeborg, belongs to this genus. Moreover, the *Paratanais rigidus* Sp. Bate and *Leptochelia coeca* Harger, ought to be referred to the same genus. Finally, Mr. F. Beddard has recorded a species, *L. australis*, from the Challenger Expedition.

1. Leptognathia longiremis (Liljeb.)

(Pl. XII).

Tanais longiremis Lilljeborg, l. c. p. 19.
Syn: *Tanais islandicus,* G. O. Sars.

Specific Characters. — Body of female rather slender and elongated, more than 7 times as long as it is broad; cephalosome about the length of the first 2 segments of mesosome combined, with the proximal half of uniform breadth, the distal one abruptly attenuated; first free segment of mesosome about same size as the last one, both being shorter than the others; metasome well developed, exceeding in length the last 2 segments of mesosome combined, terminal segment nearly occupuying $^1/_3$ of the length of metasome, and armed on each side with a minute deflexed denticle. Body of male much shorter than in female, being scarcely more than 5 times as long as it is broad; cephalosome rather broad in proportion to its length; all free segments both of mesosome and metasome of about equal length, the terminal one narrowly produced at the tip. Superior antennæ in female gradually tapering distally, basal joint about equalling in length the other 3 combined, 2nd joint shorter than the outer 2 taken together; those in male attaining in length $^1/_4$ of the body, the first 2 joints of the peduncle large and expanded, flagellum about the length of the peduncle, and having the 2 outer joints much longer than the other 2. Chelipeds in female rather strong, with the hand considerably dilated, oval triangular in form, and scarcely smaller than the carpus, with a slight dentated crest in front at the insertion of the dactylus, the latter crested along the middle, thumb distinctly serrated at the end inside; those in male with the hand much narrower than in female, and furnished inside with a transverse row of about 10 flattened spines increasing in length behind, fingers quite simple, pointed, the immovable one rather short. Uropoda in female attaining half the length of the metasome, both rami biarticulate, the inner one more than 3 times as long as the outer, and tipped by rather long setæ; inner ramus in male distinctly triarticulate. Length of female 3.75 mm., of male 2.55 mm.

Remarks. — This is the largest and finest of the Norwegian species, and may, moreover, easily be recognized by the structure of the chelipeds and uropoda, as also by the dentiform projection occurring on each side of the terminal segment of the metasome. The form at first recorded by the present author from the Norwegian North Atlantic Expedition as *Tanais islandicus* is undoubtedly identical with Lilljeborg's species.

Occurrence. — The species occurs along the whole Norwegian coast, from Christianiafjord to Vadsö in depths ranging from 30 to 100 fathoms.

Distribution. — Off Reykjavik, Iceland, and at Stat. 290 of the Norwegian North Atlantic Expedition (the present author); coast of Denmark (Meinert).

2. **Leptognathia breviremis** (Lilljeb.)

(Pl. XIII, fig. 1)

Tanais breviremis, Lilljeborg, l. c. p. 21.

Specific Characters. — ♀. Body much shorter and thicker than in the preceding species, being scarcely 6 times as long as it is broad, with the cephalosome longer than the first 2 segments of mesosome combined, and rather narrowed in front. Segments of mesosome separated by rather deep, though narrow constrictions, the 1st one not being much shorter than the 2nd. Metasome somewhat fusiform in outline, being slightly dilated in the middle, with the side-contours regularly convex, and the terminal segment evenly rounded at the tip. Superior antennæ with the basal joint not attaining the length of the other 3 combined, 2nd joint fully as long as the outer 2 taken together. Chelipeds of moderate size, with the hand about the size of the carpus, and somewhat dilated beyond the middle, fingers much shorter than the palm. Pereiopoda resembling in structure those in the preceding species, except that the basal joint of the 3 posterior pairs is less tumefied. Uropoda very short, scarcely longer than the terminal segment of metasome, inner ramus biarticulate and tipped by long divergent setæ, outer one extremely small, uniarticulate. Length 1.45 mm.

Remarks. — The present species, established by Prof. Lilljeborg, is easily distinguished from the other species belonging to this genus by its comparatively short and thick body, and by the comparatively short uropoda, which latter character has given rise to the specific name proposed by its discoverer. It is a rather small species.

Occurence. — I have met with this form rather frequently in the Christiania Fjord at depths ranging from 20 to 60 fathoms, and also in several other places on the south and west coasts of Norway. It extends northwards as far as Kvalö on the Nordland coast.

Distribution. — Bohuslän (Lilljeborg); Kattegat (Meinert).

3. **Leptognathia filiformis** (Lilljeb.)

(Pl. XIII, fig. 2).

Tanais filiformis, Lilljeborg, l. c. p. 23.

Specific Characters. — ♀. Body extremely slender, almost filiform, 11 times as long as it is broad, with the cephalosome rather narrow, and the 1st and last segments of mesosome scarcely more than half as long as the others. Metasome slightly dilated, and scarcely longer than the last 2 segments of mesosome combined, terminal segment of medium size, and obtusely rounded at the tip. Superior antennæ with the basal joint much shorter than the other 3 combined, 2nd joint comparatively large, equalling in length the outer 2 taken together. Chelipeds not very strong, with the hand subtriangular and about the length of the carpus. Pereiopoda comparatively small, basal joint of the 3 posterior pairs considerably tumefied. Uropoda attaining half the length of the metasome, inner ramus slender, biarticulate, outer one represented only by a small knob-like projection of the basal part, carrying 2 slender setæ. Length 2.70 mm.

Remarks. — This form, likewise first described by Prof. Lilljeborg, is easily recognized by its extremely slender, almost filiform body, and by the apparently single-branched uropoda.

Occurrence. — I have met with this species occasionally in several places on the south and west coasts of Norway, from the Christiania Fjord up to Kvalö on the Nordland coast, in depths ranging from 30 to 100 fathoms.

Distribution. — Bohuslän (Lilljeborg), Öresund (Meinert).

4. Leptognathia brevimana (Lilljeborg).

(Pl. XIII, fig. 3).

Tanais brevimanus, Lilljeborg, l. c. p. 22.

Specific Characters. — ♀ Body slender and elongated, about 10 times as long as it is broad, with the cephalosome only narrowed in its most anterior part. First and last segment of mesosome about same size and shorter than the others, which are fully as long as they are broad. Metasome rather large, considerably longer than the last 2 segments of mesosome combined, and also somewhat broader, terminal segment well developed, occupying more than $^1/_3$ of the metasome and obtusely rounded at the tip. Superior antennæ of the usual structure, 2nd joint not quite as long as the outer 2 combined. Chelipeds not very large, hand shorter than the carpus, subtriangular, fingers not attaining the length of the palm. Pereiopoda comparatively small, basal joint of the 3 posterior pairs less tumefied than in L. filiformis. Uropoda about the length of the terminal segment of metasome, inner ramus well developed, biarticulate, with the last joint rather short, outer ramus represented by a rather strong, mucroniform projection not defined from the basal part, and carrying outside 2 or 3 unequal setæ. Length 2.80 mm.

Remarks. — This species was likewise established by Prof. Lilljeborg, and may easily be recognized by the comparatively short hand of the chelipeds, but more especially by the peculiar structure of the uropoda.

Occurrence. — The species occurs along the whole Norwegian coast, from the Christiania Fjord to Vadsö, in depths ranging from 30 to 100 fathoms.

Distribution. — Bohuslän (Lilljeborg), Mediterranean at Messina (the present author); coast of Denmark (Meinert).

5. **Leptognathia dentifera,** G. O. Sars, n. sp.

(Pl. XIV, fig. 2)

Specific Characters. — ♀. Body moderately slender, being not quite 8 times as long as it is broad, cephalosome rather narrowed in front. First free segment of mesosome somewhat longer than the last one, but considerably shorter than the other 4. Metasome rather poorly developed, scarcely as long as the last 2 segments of mesosome combined, and not any broader, terminal segment comparatively short and obtusely rounded at the tip. Superior antennæ with the 2nd joint exceeding in length the outer 2 combined. Chelipeds not very strong, hand comparatively short, scarcely attaining the length of the carpus, triangular in form, with an obtuse projection in front of the insertion of the dactylus. Pleopoda extremely small, though of normal structure, natatory setæ very short. Uropoda exceeding half the length of the metasome, basal part produced at the end inside to an inflexed hook-shaped process, both rami well defined and biarticulate, the outer one scarcely half as long as the inner and much narrower. Length 1.60 mm.

Remarks. — This new species may be at once distinguished from any of the forms previously described, by the poor development of the pleopoda, but more especially by the peculiar hook-like projection issuing from the basal part of the uropoda inside, which latter character has given rise to the specific name here proposed.

Occurrence. — I have only seen a few female specimens of this form, some of which were ovigerous. They were taken in the Christiania Fjord at Hankö and Soon from depths of 60—100 fathoms.

6. Leptognathia manca, G. O. Sars.

(Pl. XIV, fig. 3).

Leptognathia (?) *manca*, G. O. Sars, l. c. p. 44.

Specific Characters. — ♀ Body slender and elongated, more than 8 times as long as it is broad, with the segments marked off by conspicuous constrictions, posterior half slightly attenuated. Cephalosome of moderate size, with the side edges regularly curved. First free segment of mesosome much larger than the last one, and somewhat dilated in front. Metasome equalling in length the last 2 segments of mesosome combined, and rather narrow, subcylindric in form, with the terminal segment short and obtuse. Superior antennæ with the 2nd joint much shorter than the outer 2 combined. Chelipeds of moderate size, with the hand scarcely dilated, oblong oval in form, and somewhat longer than the carpus, fingers shorter than the palm. The 3 anterior pairs of perieopoda exactly alike both in size and structure, with the dactylus slender, setiform; the 3 posterior pairs having the basal joint but slightly tumefied. Pleopoda wholly absent. Uropoda about half the length of the metasome, inner ramus biarticulate, outer one uniarticulate and scarcely half as long. Length 2.00 mm.

Remarks. — The total absence (in the female) of pleopoda is a very striking feature, which at first put me in some doubt as to the true generic relation of this form. Having, however, on a closer examination, found it to agree fairly well in all other essential characters with the species of the present genus, I prefer to retain it in the genus *Leptognathia*, as a somewhat anomalous species.

Occurrence. — I have found this form in two widely separated places on the Norwegian coast, viz., in Eidsfjord, west of Listerland, and at Apelvær, Namdal. In both places it occurred in rather small numbers at depths of 100—150 fathoms.

Gen. 5. Tanaopsis, G. O. Sars, n.

Generic Characters. — Body comparatively robust, with the metasome unusually large and composed of 6 well-defined segments. Eyes wanting. Superior antennæ in female distinctly 4-articulate. Oral parts very poorly developed. Mandibles extremely small, and rudimentary, unarmed, and without a trace of molar expansion. 1st pair of maxillæ with the masticatory lobe much curved. Maxillipeds with the masticatory lobe very short, transverse, palp slender and but slightly setous. Chelipeds strongly built, with the basal joint very large and prominent below, carpus comparatively short and thick, hand somewhat curved and scarcely expanded in the middle. 1st pair of pereiopoda much larger than the others. Pleopoda rather fully developed. Uropoda short, biramous, both rami biarticulate and very unequal in size. Incubatory pouch normal.

Remarks. — The present new genus is founded upon the form recorded by the present author at an earlier date, as *Leptognathia laticaudata,* which, on a closer examination, has proved to differ very materially, especially in the structure of the oral parts, from the species of that genus, and therefore ought more properly to be regarded as the type of a distinct genus. The unusually large and broad metasome together with the strongly-built chelipeds and the comparatively robust form of the body, somewhat recall the genus *Tanais;* but the oral parts are very different, and the metasome is composed of the normal number of segments. The genus contains as yet but a single species.

Tanaopsis laticaudata, G. O. Sars.

(Pl. XIV, fig. 1)

Leptognathia laticaudata, G. O. Sars, l. c. p. 43.

Specific Characters. — ♀. Body linear, somewhat depressed, not much more than 6 times as long as it is broad, with the segments marked off by very narrow constrictions. Cephalosome scarcely longer than it is broad, and considerably narrowed anteriorly, frontal margin subangular in the middle. The first 2 segments of mesosome much shorter than the others, which are rectangular in shape. Metasome about half the length of mesosome, but considerably broader, being rather dilated in the middle, terminal segment well developed, pentagonal in form, tip obtusely angular. Superior antennæ about the length of the cephalosome, terminal joint rather slender equalling in length the 2 preceding ones combined. Inferior antennæ with the penultimate and antepenultimate joints of the peduncle somewhat expanded and each having above a strong bristle. Chelipeds very strong, with the hand considerably longer than the carpus, and having inside a transverse row of small bristles, fingers about the length of the palm, the movable one serrated along the outer edge, the immovable one terminating in 3 strong denticles. 1st pair of pereiopoda considerably longer than the others, with the propodal joint conically produced, and the dactylus very slender, setiform; the 3 posterior pairs rather strongly built, with the basal joint moderately tumefied, and the meral and carpal joints each provided inside with a single very small denticle. Uropoda not nearly attaining the length of the terminal segment of metasome, inner ramus rather thick, outer scarcely half as long, and much narrower. Length 2.60 mm.

Remarks. — As stated above, this form was first described by the present author as a species of the genus *Leptognathia.* Having, however, subsequently had an opportunity of examining the oral parts more closely, I have found it necessary to separate it generically. It is easily distinguished from the other Norwegian Tanaids by the strongly dilated metasome and the peculiarly rigid appearance of the chelipeds.

Occurrence. — I have met with this form in a few places on the south coast of Norway (Fredriksværn, Nevlunghavn, Mærdö) in comparatively shallow water, the depth ranging from 6 to 20 fathoms.

Distribution. — Mediterranean at Naples and Messina (the present author).

Gen. 6. **Cryptocope,** G. O. Sars, 1880.

Generic Characters. — Body more or less robust, with the cephalosome considerably narrowed anteriorly, front truncated. Metasome scarcely broader than the mesosome, and composed of 6 well-defined segments. Eyes wanting. Superior antennæ in female short, 4-articulate, in male much larger and of a structure similar to that in the genus *Leptognathia.* Mandibles well developed, with the cutting edge coarsely dentated, and having on the right mandible a rather large secondary lamella, molar expansion well defined, conic or lamellar. Chelipeds rather strong and of a similar structure in the two sexes. Pereiopoda slender, especially the 3 anterior pairs. Pleopoda in female very small and rudimentary, with the rami extremely small, lobular; those in male well developed, natatory. Uropoda in female short, biramose, rami very unequal; those in male much more fully developed. Incubatory pouch formed only by 2 lamellæ issuing from the bases of the 4th pair of pereiopoda.

Remarks. — This genus is chiefly characterized by the rudimentary condition of the pleopoda in the female. In the structure of the other appendages it exhibits a close affinity to the genus *Leptognathia;* but the structure of the mandibles is slightly different, and the incubatory pouch is constructed as in the genus *Tanais.* Besides the Norwegian species described below, the form at first recorded by the present author as *Tanais Vöringii* belongs to this genus. Moreover, Dr. Hansen has described a third species from the Kara Sea as *C. arctica.*

Cryptocope abbreviata, G. O. Sars.

(Pl. XV, fig. 1).

Tanais abbreviatus, G. O. Sars, Beretning om en i Sommeren 1865 foretagen zool. Reise, p. 41.

Specific Characters. — ♀ Body extremely short and stout, sub-depressed, scarcely more than 3 times as long as it is broad. Cephalosome scarcely as long as it is broad posteriorly, and considerably narrowed in front, frontal margin slightly bisinuate, with the lateral corners somewhat produced. Fifth and 6th segments of mesosome somewhat larger than the other 4, which are very short. Metasome but little longer than the last 2 segments of mesosome combined, and gradually narrowed in its posterior part, terminal segment comparatively short and obtusely produced at the tip. Superior antennæ somewhat shorter than the cephalosome, basal joint about the length of the other 3 combined. Chelipeds rather strong, carpus comparatively short and thick, hand longer than the former, and slightly narrowed distally, fingers about the length of the palm. The 3 anterior pairs of pereiopoda rather slender, with the dactylus long and setiform; the 3 posterior pairs somewhat stronger, but with the basal joint not much tumefied. Pleopoda with the rami quite smooth, the inner one extremely minute, nodiform. Uropoda scarcely attaining the length of the terminal segment of metasome, inner ramus distinctly biarticulate, and tipped with long diverging setæ, outer one extremely minute and uniarticulate. Length 1,40 mm.

Remarks. — This form may be easily recognized from the other Norwegian Tanaids by its extremely short and thick body, and by the rudimentary condition of the pleopoda. It differs from *Cryptocope arctica* Hansen, which it somewhat resembles in the form of the body, in the rami of the pleopoda being quite smooth, whereas in the last-named species, according to Dr. Hansen, they are tipped with small bristles.

Occurrence. — I first discovered this form in the Christiania Fjord at a depth of about 30 fathoms, and have subsequently found it occasionally in other places also, both on the south and west coasts of Norway. It has not been recorded by any other author.

Gen. 7. **Haplocope**, G. O. Sars, 1880.

Generic Characters. — ♀. Body slender and elongated, resembling, as regards its outward appearance, some species of the genus *Leptognathia*. Metasome rather narrow, sublinear, with all the segments well defined. Eyes wanting. Superior antennæ (in female) distinctly 4-articulate. Mandibles well developed, and resembling in structure those in the genus *Typhlotanais*, the molar expansion being rather strong, cylindric, and armed at the tip with dentiform tubercles. Chelipeds comparatively small, with the hand scarcely dilated. The first 3 pairs of pereiopoda of similar structure, and more slender than the 3 posterior. Pleopoda (in female) imperfectly developed, forming simple oval lamellæ, without a trace of setæ. Uropoda rather slender, biramous, rami unequal, biarticulate. Incubatory pouch normal.

Remarks. — The most prominent character of this genus is the simple structure of the pleopoda in the female, and it is indeed from this character, that the generic name has been derived. In outward appearance, as also in the structure of the several appendages, it exhibits a close resemblance to the genus *Leptognathia;* but the structure of the mandibles is very different, and agrees much more closely with that found in the genus *Typhlotanais.* The genus contains as yet but a single species.

Haplocope angusta, G. O. Sars.

(Pl. XV. fig. 2).

Haplocope angusta, G. O. Sars, l. c. p. 51.

Specific Characters. — ♀. Body extremely slender and narrow, being fully 10 times as long as it is broad. Cephalosome rather small, slightly narrowed anteriorly, front truncated. 1st free segment of mesosome but little smaller than the next succeeding ones and somewhat dilated in front, last segment the smallest. Metasome about the length of the last 2 segments of mesosome combined, and nearly of uniform breadth throughout, terminal segment of medium size, and angularly produced in the middle. Superior antennæ somewhat shorter than the cephalosome, basal joint only attaining the length of the 2 succeeding joints combined, last joint narrow, conic. Chelipeds rather small, hand about the length of the carpus, fingers shorter than the palm. 1st pair of pereiopoda scarcely longer than the 2 succeeding pairs; the 3 posterior pairs a little stronger, and having the outer joints spinous. Uropoda about half the length of the metasome, inner ramus rather elongated, outer scarcely more than half as long and much narrower. Length 1.70 mm.

Remarks. — As stated above, this is the only species as yet known of the genus, and may easily be recognized by its slender, narrow body, and the simple, lamelliform pleopoda.

Occurrence. — I have met with this form occasionally in 3 widely remote localities, viz., in Eidsfjord, west of Listerland, at Bekkervig, on the west coast of Norway, and at Apelvær in Namdal. In all 3 places it occurred in rather small numbers together with other Tanaids, in depths ranging from 100 to 150 fathoms.

Gen. 8. **Strongylura,** G. O. Sars.

Generic Characters. — Body more or less elongated, subcylindric in form, with rather hard integuments. Cephalosome comparatively large, narrowly truncated in front. Metasome of quite an unusual size, cylindric, slightly widening behind, and composed of 6 well-defined segments, the last of which is very large, cupuliform. Eyes wanting. Superior antennæ in female rather strong, 4-articulate. Mandibles well developed, cutting part strongly incurved, and divided into a few short teeth, molar expansion large, laminar, minutely dentated at the tip. Chelipeds strongly built, with the hand rather large. Pereiopoda comparatively slender and elongated, with the dactylus narrow, setiform. Pleopoda in female wholly absent. Uropoda very small, though distinctly biramous.

Remarks. — The present genus is prominently distinguished by the peculiar appearance, in the female, of the metasome, which is of quite an unusual size, and has the segments perfectly cylindric, without a trace of epimera. Nor is the slightest rudiment of pleopoda to be detected in the female, whereas in the male they seem to occur in the normal condition. In addition to the type species described below, Messrs. Norman & Stebbing have recorded another species, *S. arctophylax,* from the Porcupine Expedition.

Strongylura cylindrata, G. O. Sars.

(Pl. XVI, fig. 1).

Strongylura cylindrata, G. O. Sars, l. c. p. 53.

Specific Characters. — ♀. Body rather slender and narrow, about 9 times as long as it is broad, and slightly narrowed in the middle, with the segments marked off by conspicuous constrictions. Cephalosome comparatively large, almost equalling in length the first 3 segments of mesosome combined, oblong oval in form, and slightly narrowed in front. 1st free segment of mesosome much shorter than the others. Metasome occupying rather more than $^1/_3$ of the length of the body, or equalling about the first 5 segments of mesosome combined, slightly widening behind, terminal segment large, oblong oval and very smooth, tip obtusely rounded. Superior antennæ almost attaining the length of the cephalosome, basal joint about the length of the other 3 combined, terminal joint comparatively short and obtusely blunted at the tip. Chelipeds rather strong, hand oblong oval and longer than the carpus, fingers shorter than the palm, the immovable one minutely serrulate inside. The 3 posterior pairs of pereiopoda considerably more strongly built than the 3 anterior ones, and having the outer joints armed with ciliated spines, basal joint remarkably constricted at the base. Uropoda very short, inner ramus conical, biarticulate, and tipped by long diverging setæ, outer ramus extremely minute, tuberculiform, though well defined from the basal part. Length 2.85 mm.

Remarks. — From *S. arctophylax* of Norman & Stebbing, the Norwegian species may be at once distinguished by its much more elongated body and the comparatively larger size of the metasome. A few specimens, however, are of considerably shorter form, but as in all of these there are distinct traces of pleopoda, they are, I believe, of the male sex, though probably not yet sexually mature.

Occurrence. — I have found this peculiar Tanaid in several places, both on the south and west coasts of Norway, in depths ranging from 50 to 200 fathoms. It extends northwards to Selsövig, situated just within the polar circle.

Gen. 9. **Anarthrura,** G. O. Sars, 1880.

Generic Characters. — Body elongated, subdepressed, with rather thin, semipellucid integuments. Cephalosome comparatively short and obtusely truncated in front. Metasome in female very poorly developed, narrower than the mesosome, and without a trace of segmentation; that in male, however, of quite normal appearance, being divided into 6. well-defined segments. Eyes wanting. Superior antennæ in female 4-articulate, in male but slightly different, though composed of 5 articulations. Mandibles extremely small and rudimentary, cutting edge simple, molar expansion wanting. Chelipeds comparatively small, with the basal part of a somewhat unusual structure, being oval, tumid, and divided into 2 distinct segments, hand rather small, with the palm unusually short. The 3 anterior pairs of pereiopoda rather slender and nearly equal, the 3 posterior pairs rather different, and considerably more strongly built. Pleopoda in female wholly absent, in male normally developed. Uropoda imperfectly biramous, the outer ramus not being defined from the basal part.

Remarks. — In this genus also, the structure of the metasome in the female yields the most conspicuous distinctive character; but whereas in the genus *Strongylura* this division is of quite an unusual size, it is in the present genus more reduced in size than in any hitherto known Tanaid. In the male, however, this part exhibits quite a normal appearance. The structure of the chelipeds is likewise somewhat peculiar and differs, among other things, from that of all other Tanaids in the form of the basal part. The oral parts, and especially the mandibles, exhibit a similar rudimentary condition to that found in the genus *Tanaopsis*. Besides the typical species described below, the Australian form *Paratanais linearis* Haswell, according to the opinion of the Rev. Mr. Stebbing, should more properly be referred to this genus.

Anarthrura simplex, G. O. Sars.

(Pl. XVI, fig. 2).

Anarthrura simplex, G. O. Sars, l. c. p. 54.

Specific Characters. — Body in female about 8 times as long as it is broad, in male somewhat shorter, segments marked off by rather deep constrictions. Cephalosome distinctly depressed, scarcely longer than it is broad, and obtusely truncated in front. 1st and last segments of mesosome shorter than the others, and almost quadrate in outline. Metasome in female scarcely longer than the penultimate segment of mesosome, narrow cylindric, or very slightly depressed, and somewhat constricted in the middle, tip obtusely angular; that in male nearly twice as large, and of altogether normal appearance. Superior antennæ in female about the length of the cephalosome, basal joint but little longer than the 2 succeeding ones combined, terminal joint narrow, conical in form. Chelipeds with the basal part occupying half their length, and having its first segment much larger than the 2nd, hand longer than the carpus, but rather feeble, with the palm unusually short, fingers narrow and not perfectly contiguous when shut, the movable one slightly serrated outside, the immovable one nearly straight and terminating in a lanceolate point. The 3 anterior pairs of pereiopoda exactly alike, having the propodal joint tapering conically, and the dactylus long and setiform; the 3 posterior pairs more strongly built, with the basal joint rather tumefied, and the dactylus quite short. Uropoda generally turned obliquely outwards, inner ramus well defined, biarticulate, outer represented by a conical, setiferous projection of the basal part. Length of female 2.35 mm.

Remarks. — This peculiar form may at once be distinguished from our other Tanaids, at least in the female sex, by the rudimentary condition of the metasome. In both sexes, moreover the structure of the chelipeds and uropoda may serve for recognizing the species.

Occurrence. — I have met with this form occasionally together with other Tanaids in several places, both on the south and west coasts of Norway, as far north as Kvalö, in depths ranging from 50 to 150 fathoms.

Gen. **Pseudotanais,** G. O. Sars, 1880.

Generic Characters.—Body short and stout, not very different in the 2 sexes, with the cephalosome more or less contracted in front, and having no distinct ocular lobes. The 3 anterior segments of mesosome much shorter than the 2 succeeding ones. Metasome not broader than the mesosome, and composed of 6 well-defined segments. Eyes imperfectly developed, or altogether wanting. Superior antennæ of same structure in the 2 sexes, very narrow, 3-articulate; inferior antennæ almost of same size as the superior. Mandibles comparatively small, cutting part in the right mandible simple, minutely serrulate, in the left one provided with a rather large secondary lamella, molar expansion in both mandibles very narrow, styliform. Maxillipeds with the masticatory lobes coalesced. Chelipeds large, of a similar structure in the 2 sexes, hand very much elongated, fingers narrow and acuminate. Pereiopoda slender and elongated; 1st pair somewhat differing from the others, which are subsimilar in structure, each having a remarkably strong, cultriform spine at the end of the carpal joint inside. Pleopoda sometimes wanting in female. Uropoda biramose, both rami well-defined and biarticulate. Incubatory pouch formed by only 2 lamellæ, issuing from the bases of the 4th pair of pereiopoda.

Remarks.—This genus agrees with the genus *Tanais* in the less conspicuous sexual difference, and in the structure of the incubatory pouch, but otherwise differs very materially, both as to its outward appearance, and to the structure of the several appendages. It comprises as yet 7 species, 3 of which belong to the Norwegian fauna, and will be described below. Of the other 4, the one, *P. Willemoesi* (Studer), has been taken off the Kerguelen Islands, the second, *P. mediterranea* G. O. Sars, at Spezia, and the other 2, *P. affinis* and *P. crassicornis* Hansen, in the Kara Sea.

1. **Pseudotanais forcipatus** (Lilljeborg).

(Pl. XVII, fig. 1.)

Tanais forcipatus, Lilljeborg, l. c. p. 16.

Specific Characters.—Body of female scarcely more than 4 times as long as it is broad, in male still shorter and stouter. Cephalosome greatly narrowed anteriorly, with the front transversely truncated. The first 3 segments of mesosome combined not exceeding the length of the 4th segment, which about equals in size the 5th, both being quadrangular in shape; last segment much shorter. Metasome in female about the length of the last 2 segments of mesosome combined, and slightly narrowed distally, terminal segment obtusely rounded at the tip; that in male much more fully developed, equalling about $^1/_3$ of the length of the body. Eyes in both sexes wholly wanting. Superior antennæ about the length of the cephalosome, basal joint not quite attaining the length of the other 2 combined, last joint longer than the middle one. Chelipeds very large, attaining almost half the length of the body, hand twice as long as the carpus, fingers very narrow, equalling the palm in length, and nearly straight, but distinctly forcipate, the thumb being deeply sinuated at the base inside. First pair of pereiopoda with the propodal joint conically tapered, dactylus very slender, setiform; carpal spine of the succeeding pairs not very large. Pleopoda in female wholly wanting. Uropoda but little longer than the terminal segment of the metasome, outer ramus much shorter and narrower than the inner. Length of female 1.40 mm., of male 1.00 mm.

Remarks. — This is the first recorded species, and may therefore be regarded as the type of the genus. It is easily recognized by the forcipate character of the chelipeds, not found in any of the other species, and equally distinct in both sexes.

Occurrence.—The species occurs along the whole Norwegian coast, as far north as Kvalö, but nowhere in any abundance.

Distribution.—Bohuslän (Lilljeborg), Öresund (Meinert)

2. **Pseudotanais Lilljeborgi**, G. O. Sars.

(Pl. XVII, fig. 2.)

Pseudotanais Lilljeborgi, G. O. Sars, l. c. p. 48.

Specific Characters.—♀. Body somewhat more robust than in the preceding species, being scarcely 4 times as long as it is broad, and conspicuously depressed. Cephalosome rather large, and less abruptly narrowed anteriorly, front

An Account
of
The Crustacea of Norway.

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AN ACCOUNT

OF THE

CRUSTACEA

OF

NORWAY

WITH SHORT DESCRIPTIONS AND FIGURES OF ALL THE SPECIES

BY

G. O. SARS

VOL. II.

ISOPODA

PART III, IV.

ANTHURIDÆ, GNATHIIDÆ, ÆGIDÆ, CIROLANIDÆ, LIMNORIIDÆ

A

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SOLD BY
ALB. CAMMERMEYER'S FORLAG, CHRISTIANIA
1897

JUN 2 1897

obtusely rounded. The first 3 segments of mesosome combined somewhat exceeding in length the 4th segment, which is about the same size as the 5th, both being almost twice as broad as they are long; last segment, as usual, considerably smaller. Metasome about the length of the last 2 segments of the mesosome combined, and distinctly narrowed distally. Eyes present, but very small, punctiform, occurring on the sides of the cephalosome, at some distance from the frontal margin. Superior antennæ with the last 2 joints of about equal length, and combined, not quite attaining the length of the basal one. Chelipeds very strong, hand oblong oval, not attaining twice the length of the carpus, fingers shorter than the palm, and not forcipate. Pereiopoda resembling in structure those in the preceding species, though perhaps somewhat less slender; carpal spine of the 5 posterior pairs comparatively larger, and more conspicuously cultriform. Pleopoda (in female) wholly wanting. Uropoda of about same appearance as in *P. forcipatus.* Length of female 1.55 mm.

Remarks.—Though rather nearly allied to the preceding species, the present form may be easily distinguished by the somewhat different form of the cephalosome, the presence of distinct, though very small eyes, and by the chelipeds not being forcipate.

Occurrence.—The only place where I have observed this form, is in the Varanger Fjord at Vadsö. It occurred here rather sparingly in a depth of 100—120 fathoms. Out of Norway, it has not yet been recorded.

3. Pseudotanais macrocheles, G. O. Sars.

(Pl. XVIII.)

Pseudotanais macrocheles, G. O. Sars, l. c. p. 47.

Specific Characters.—♀. Body very short and compact, scarcely more than 3 times as long as it is broad. Cephalosome scarcely exceeding in length the 3 anterior segments of mesosome combined, and strongly contracted in front, tip narrowly truncated. Free segments of mesosome about as in the 2 preceding species. Metasome gradually narrowed distally, with the terminal segment evenly rounded at the tip. Eyes wholly absent. Superior antennæ very slender, considerably exceeding the cephalosome in length, last joint longer than the 2nd, and both combined, about the length of the basal one. Chelipeds exceedingly large, attaining nearly half the length of the body, hand very much elongated, with the fingers slender and narrow, considerably exceeding the palm in length, but not forcipate. Pereiopoda rather slender, 1st pair with the propodal joint longer than the 2 preceding joints combined, and conically tapered, dactylus long and setiform; carpal spine of the succeeding pairs very large and conspicuously cultriform. Pleopoda well developed, both rami tipped by long natatory setæ. Uropoda of a similar structure to that in the 2 preceding species, though somewhat longer. Length of female 1.45 mm.

Remarks.—As to its general outward appearance, this species resembles, on the whole, the 2 preceding ones, though the body is of a still shorter and stouter form. It is, moreover, easily distinguished by the long and slender antennæ, the structure of the chelipeds, and the presence of well-developed pleopoda, wholly wanting in the female of the other known species. The carpal spine of the 5 posterior pairs of pereiopoda is also considerably larger than in the other 2 Norwegian species.

Occurrence.—I have met with this form occasionally in 3 widely-distant places on the Norwegian coast, viz., in the Christiania Fjord, at Bekkervig, south of Bergen, and in the Varanger Fjord at Vadsö. Out of Norway, it has not yet been recorded.

Tribe 2.

FLABELLIFERA.

Remarks.—It is not easy to give any exhaustive diagnosis of this tribe, as it comprises Isopods of extremely different structure. The only essential character common to all the forms, is the relation of the uropoda, which are not, as in the preceding tribe, terminal, but lateral, and arranged in such a manner as to form, with the last segment of the metasome, a caudal fan, similar to that found in some of the higher Crustacea, the shrimps and lobsters. As to the pleopoda, they exhibit more generally the character of true swimming organs, though at the same time they may also serve for respiration, and it is only in exceptional instances that the latter function is exclusively devoted to them. By far the greater number of the forms seem to lead a parasitic, or at least semi-parasitic existence, and for this reason, the oral parts are often found to be peculiarly modified, and, moreover, a number of the legs, in some cases all of them, to assume a more or less pronouncedly prehensile character. The tribe includes 6 very distinct families, viz., *Anthuridæ, Gnathiidæ, Cymothoidæ, Serolidæ, Sphæromidæ* and *Limnoriidæ;* but of these, the 3rd has generally been again subdivided into 6 families, viz., *Ægidæ, Cirolanidæ, Corallanidæ, Alcironidæ, Barybrotidæ* and *Cymothoidæ,* thereby increasing the number of families to no less than 11 in all. Five of these families are represented in the fauna of Norway, and will be here treated of.

Fam. 1. Anthuridæ.

Characters.—Body long and slender, subcylindric in form, and rather flexible. Head comparatively small. Segments of mesosome all well defined, and without distinct coxal plates. Metasome comparatively short, with the anterior segments sometimes coalesced, telson generally well defined, linguiform. Both pairs of antennæ, at least in female, short and subequal in length, originating close together, the one pair beneath the other. Oral parts modified for perforation and suction. Legs composed of the normal number of joints, the basal and ischial ones being rather slender, and forming together a genicular bend; 1st pair, as a rule, much stronger than the others and subcheliform; the 2 succeeding pairs likewise subcheliform, but much feebler; the 4 posterior pairs ambulatory. Pleopoda chiefly branchial in character, 1st pair large, more or less covering the others. Uropoda with the outer ramus extending upwards, so as generally to arch over the base of the telson. Incubatory pouch apparently not formed by distinctly defined lamellæ.

Remarks.—In their general outward appearance, the forms belonging to this family somewhat recall the *Tanaidæ*, having a similar long and narrow body, and in some cases, there is even to be found a slight attempt at a cheliform structure of the 1st pair of legs. But otherwise, the two families are widely different. The structure of the oral parts would seem to point to a parasitic habit, but in none of the forms has the mode of parasitism as yet been stated. The manner in which the metasome terminates is very peculiar, and unlike that found in other Isopoda; for the telson is well defined from the last segment, and more or less strongly deflexed, whereas the outer ramus of the uropoda extends upwards so as to arch over the base of the telson, thereby giving the caudal fan a somewhat cup-shaped appearance. It is indeed from this character that the name *Anthura,* given to the typical genus, has been derived. In some of the exotic forms, however, this peculiar formation would appear to be less pronounced than in the northern forms. Several genera have been established in recent times, amounting to about 10 in all. Of these, only 2 are represented in the fauna of Norway.

Gen. 1. **Calathura,** Norm. & Stebb., 1886.

Generic Characters.—Body moderately slender, with the 2nd segment of mesosome very movably connected, both with the preceding and succeeding segments, dorso-lateral carinæ in all the segments well marked. Metasome comparatively short, with the segments not very distinctly defined, though apparently present in the normal number. Eyes imperfectly developed, or quite wanting. Antennæ subequal in length, both pairs having the flagella multi-articulate; the superior ones scarcely different in the two sexes. Buccal mass projecting in front as a sharply-pointed cone. Mandibles terminating in a lancet-like point, and having inside, a flexuous lamella, by which a channel-like groove is formed, leading from the tip to the base of the mandible, palp well developed, 3-articulate. Anterior lip narrow, terminating in an obtusely conical point; posterior lip tapering distally, and slightly bifid at the tip. Anterior maxillæ simple, spear-like, terminal part armed with recurved teeth. Posterior maxillæ wanting. Maxillipeds with the basal part narrow oblong, projecting at the end, inside, to a triangular, pointed masticatory lobe, palp distinctly 3-articulate, with the terminal joint rather large, lamelliform, epignath very small, rounded. 1st pair of legs powerfully developed, meral joint transversely expanded, propodos large and tumefied, with the palmar edge concaved, and defined behind by a small, thumb-like projection; the 2 succeeding pairs with the propodos much smaller, and not having the palmar edge defined. 1st pair of pleopoda very large, completely covering the other pairs below. Uropoda with the inner ramus rather broad, lamellar, biarticulate, outer ramus much smaller, uni-articulate, cordiform, edged with strong, ciliated setæ.

Remarks.—This genus has been recently established by Messrs. Norman and Stebbing, to include the arctic form, *Anthura brachiata* of Stimpson. It is very nearly allied to the genus *Paranthura* Bate & Westwood, chiefly differing in the facts that the flagella of both pairs of antennæ are multiarticulate, and that the superior ones are of the same structure in the two sexes; moreover, the uropoda exhibit a somewhat different shape. It may be noted, that in examining the oral parts, I have failed to detect any traces of the posterior maxillæ, either in this or the following genus, whereas in other genera belonging to this family (for instance Anthura), these maxillæ are stated to exist in a rudimentary condition. The present genus contains as yet only 2 species, to be described below.[1]

1. **Calathura norvegica**, G. O. Sars.

(Pl. XIX, fig. 1.)

Paranthura norvegica, G. O. Sars, Bidrag til Kundskaben om Dyrelivet paa vore Havbanker, Chr. Vid. Selsk. Forh. 1872, p. 88.

Specific Characters.—Body slender, moniliform, somewhat contracted in front of the middle, with the 1st segment of mesosome rather firmly connected to the cephalon, the 2nd, however, defined from the preceding and succeeding segments by very deep constrictions. Cephalon rather small, and seen from above, rounded oval, with the side-edges evenly convex, frontal edge slightly produced in the middle. The

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[1] A 3rd species has recently been described by M. Jules Bonnier as *C. affinis*.

first 2 segments of mesosome somewhat widening in front, the 4 succeeding ones nearly twice as long as they are broad; last segment very small. Metasome, including the telson, about the length of the last 2 segments of mesosome combined, and slightly widening behind. Eyes wholly absent. Superior antennæ with the flagellum about the length of the peduncle, and 8-articulate; inferior antennæ a little longer than the superior, with the flagellum not attaining half the length of the peduncle, and composed of about 10 articulations rapidly decreasing in size distally. 1st pair of legs with the propodos very large, oval triangular, forming a rounded expansion outside, palmar edge occupying the whole inner side, evenly concave, and fringed with short spines, dactylus long and curved, impinging against the posterior, produced corner of the palm. Propodos of the 2 succeeding pairs oval pyriform in shape, and armed on the palmar edge with 4 strong spines. Last pair of legs smaller than the 3 preceding ones. 1st pair of pleopoda with the inner plate strongly dilated in the middle, and tapering distally to an obtuse point. Uropoda with the inner ramus rather broad, laminar, terminal joint not attaining half the length of the proximal one, outer ramus short, obliquely cordiform, with the edge minutely crenulated and densely fringed with ciliated setæ. Telson oblong, linguiform, with the tip narrowly rounded, and clothed with slender bristles. Colour greyish brown, with dark brown ramifications on the sides of the cephalon. Length of adult female 12 mm.

Remarks.—The present species is very nearly allied to the succeeding one, and has, indeed, by Messrs. Norman and Stebbing, been identified with it. On a closer comparison, it is, however, found to differ not only in its much inferior size and less slender form, but also in the absolute want of eyes, and in the far greater indistinctness in the dorsal impressions of the 4th to 6th segments of the mesosome.

Occurrence.—I have only met with this form in 3 places on the Norwegian coast, viz., at the Storeggen bank, at Husö, outside the Sognefjord, and at Hvitingsö. In all 3 places it occurred rather sparingly at a depth of from 150 to 200 fathoms. Out of Norway, it has not yet been recorded.

2. **Calathura brachiata,** Stimpson.

(Pl. XIX, fig. 2.)

Anthura brachiata, Stimpson, Marine Invertebrata of Grand Manan, p. 43.
Syn: *Paranthura brachiata* Harger.
„ *Anthura arctica* Heller.

Specific Character.—Very like the preceding species, but more than twice as large, and somewhat more slender in form. Cephalon very small and, seen from above, nearly quadrate in form, with the side-contours somewhat flexuous. 2nd and 3rd segments of mesosome each with 2 small juxtaposed dorsal tubercles close to the anterior edge; the 3 succeeding segments having, in the same place, a very conspicuous oval depression; dorso-lateral keels, in these and the preceding segments, very strongly marked. Eyes fairly conspicuous, though rather small, each forming a slight bulging laterally, pigment opaque white, visual elements imperfectly developed. Antennæ resembling those in the preceding species, though having the flagella more fully developed. The other appendages of much the same structure as in *C. norvegica.* Colour uniformly greyish brown, without any pigmentary ramifications. Length reaching to 29 mm.

Remarks.—As stated above, I am of opinion that this form is specifically distinct from the preceding one. The resemblance between the two, it is true, is very close; but yet there are to be found some well-marked differences, which do not allow of their being united in one and the same species. Not to speak of the great difference in size, the present species is well distinguished by the presence of distinct, though rather imperfectly developed eyes, of which no trace is to be found in the other species, and also by the peculiar dorsal markings so conspicuous in the form here under consideration, and scarcely at all visible in *C. norvegica.*

Occurrence.—The only place on the Norwegian coast, where I have met with this form, is in the Varanger Fjord at Vadsö. It here occurred occasionally in a depth of about 120 fathoms.

Distribution.—Atlantic coast of North America (Stimpson, Harger), Franz Josef's Land (Heller), Greenland (Hansen), the Kara Sea (Hansen), Norwegian North Atlantic Expedition in several Stations, as far north as Jan Mayen and Spitsbergen (the present author), Porcupine Expedition in 6 different Stations, as far South as the bay of Biscay (Norm. & Stebbing).

Gen. 2. **Leptanthura,** G. O. Sars, n.

Generic Characters.—Body in both sexes very slender and elongated, with the metasome distinctly segmentated, and rather more fully developed in male than in female. Eyes absent. Both pairs of antennæ in female short and thick, with the flagellum rudimentary, the superior ones in the male, however, rather fully developed, with the flagellum large, multiarticulate, and densely clothed with long sensory filaments. Mandibles of a similar structure to that in *Calathura*, but having the palp smaller, with the terminal joint rudimentary. Maxillipeds narrow, with the basal part imperfectly defined from the palp, which is only composed of 2 joints, the distal one very small and narrow, masticatory lobes obsolete. 1st pair of legs very strong, propodos produced at the end of the palm to a very conspicuous, thumb-like process, giving these legs an almost chelate character; the 2 succeeding pairs with the propodos of different shape in the two sexes. 1st pair of pleopoda less fully developed than in *Calathura*, so as not to obtect the others below. Uropoda with the inner ramus rather slender, outer one very broad and but sparingly setous. Telson lanceolate, terminating in an acute point.

Remarks.—The present new genus is founded upon the form at first recorded by the present author as *Paranthura tenuis*, and subsequently referred by him to the genus *Ptilanthura* of Harger. On a closer examination, I have, however, found it necessary to separate this form also from the above-named genus, on account of some apparently very essential differences. Messrs. Norman & Stebbing retain it in the genus *Paranthura;* but this seems to me inadmissible, as it exhibits several very marked differences from that genus, both in the structure of the oral parts and in that of the other appendages. The structure of the 1st pair of legs in this genus is rather remarkable from the circumstance that it exhibits a very pronounced approach to a chelate character, like that found in the Tanaidæ.

Leptanthura tenuis, G. O. Sars.

(Pl. XX.)

Paranthura tenuis,[1]) G. O. Sars, Bidrag til Kundskaben om Dyrelivet paa vore Havbanker. Chr. Vid. Selsk. Forh. 1872, p. 89.

Specific Characters.—Body, especially in male, exceedingly slender, almost filiform, with all the segments very sharply defined. Cephalon about half the size of the 1st segment of mesosome and scarcely narrower, almost quadrate in outline, frontal margin slightly bi-sinuate. The first 2 segments of mesosome and the last of about equal size, the 4 others somewhat longer, being more than twice as long as they are broad; dorsal face of all segments perfectly smooth. Metasome, including the telson, in female about the length of the last 2 segments of mesosome combined, in male considerably longer, somewhat fusiform in shape,

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[1]) *P. tenuis* of Harger, established some years afterwards, is a very different species, not even belonging to the same genus.

being conspicuously constricted at the base of the caudal fan, all segments very sharply defined, and having distinct rounded epimera. Superior antennæ in female much shorter than the cephalon, first joint of the peduncle about the length of the other 2 combined, flagellum not exceeding in length the last peduncular joint, conic in form, and exhibiting 1 or 2 extremely small terminal joints; those in male more than twice as large, and, as a rule, reflexed, last joint of the peduncle very movably articulated to the 2nd, and gradually widening distally, flagellum fully as long as the peduncle, and rather thick at the base, being composed of about 10 articulations, each provided with a dense whorl of long sensory filaments, whereby the outer part of the antenna acquires a brush-like appearance. Inferior antennæ of same structure in the two sexes, rather stout, flagellum very small, with 3—4 extremely minute terminal joints, carrying a dense brush of bristles. 1st pair of legs likewise of a similar appearance in the two sexes, propodos large, oval, set obliquely on the short carpus, palm deeply concave, and armed with a row of flattened denticles, thumb-like process very prominent. The 2 succeeding pairs of legs with the propodos in female comparatively short, subquadrangular, palm defined below by a distinct angle, that in male much longer, pyriform, palm occupying the whole lower edge. First pair of pleopoda having the outer plate oblong oval, gradually widening distally. Uropoda with the inner ramus rather narrow, and reaching considerably beyond the telson, terminal joint about the length of the proximal one, and having at the tip a dense brush of slender bristles, outer ramus broadly cordiform, arching over the base of the telson, so as almost to meet the corresponding ramus on the other side in the middle, edge smooth, only clothed with scattered bristles. Telson in male broad, scarcely more than twice as long as it is broad, in female considerably narrower, edges smooth, except at the tip, which carries 2 long and 2 short bristles. Colour a pure white. Length of female 7 mm., of male 8½ mm.

Remarks.—By its extremely slender, filiform body, this form is easily recognized from most other *Anthuridæ,* though the species of *Anthelura* and *Hyssura* in this respect would seem to approach it. On account of its pure white colour and comparatively small size, it may at first sight be mistaken for a Tanaid.

Occurrence.—I first detected this form at Hvitingsö, outside Stavanger, in a depth of 150—200 fathoms, and have subsequently taken it in the inner part of the Stavanger Fjord at Jelse, as also rather plentifully in the Trondhjem Fjord in similar depths. It is a rather sluggish animal, creeping slowly along the bottom. At times it is seen to bend its body almost in a circle; but I have never seen it make any attempt to swim, though the structure of the pleopoda seems to admit of such a motion, at least in the male sex.

Distribution.—Stat. 22 of the Porcupine Expedition, located off Lisbon (Norm. & Stebbing).

Fam. 2. Gnathiidæ.

Characters.—Body of male and female of very different appearance, being, in the former, depressed and dilated in front, in the latter, more or less fusiform; body of immature animal (larva) also rather different, though more resembling that of female. Cephalon of male very large, as compared with that of female and larva. Mesosome apparently composed of only 5 segments, though a rudimentary anterior and posterior segment may be discerned. Metasome narrowing abruptly to a width much narrower than the mesosome, composed of 6 segments, the last triangularly produced behind, and forming together with the uropoda a normal caudal fan. Antennæ comparatively short, and of same structure in the two sexes, issuing close together from the outer corners of the cephalon. Oral parts in the adult animal much reduced, consisting in the male of a pair of mandibles freely projecting in front and a pair of peculiarly modified maxillipeds, in female of only the latter appendages. Oral parts in the larva present in the normal number, and densely crowded together, to form an apparatus for penetration and suction. Gnathopoda in male valve-like, arching over the lower face of the cephalon, in female much smaller and more distinctly segmented, in the larva pediform, terminating in a strong hook. Only 5 pairs of pereiopoda present, the last pair being absent. Pleopoda of equal structure, natatory or exclusively respiratory (in the adult animal). No true incubatory pouch present, the ova undergoing their development within the dilated body-cavity.

Remarks.—This is one of the most anomalous families of the order, and in some points even differs more pronouncedly from the typical Isopoda, than do the *Apseudidæ* and *Tanaidæ.* The sexual differences are highly remarkable, and the not yet mature animals differ also so widely from the adults, that they have long been referred to quite a separate family, *Pranizidæ.* The latter lead a true parasitic existence, as shown by the peculiarly modified oral parts, whereas the adults are scarcely at all parasitic. The complete absence of the last pair of pereiopoda affords another very anomalous character, not found in other Isopoda, except in the recently hatched young.

The family comprises as yet but a single genus, *Gnathia* Leach; but it is most probable, that it will be found appropriate to subdivide this genus into several distinct genera, as there are some apparently essential differences to be found on comparing the several species. Indeed, the Rev. Mr. Stebbing has recently proposed to raise a most anomalous form described by Mr. Beddard from the Challenger Expedition, to the rank of a distinct genus *Euneognathia,* and he has advanced the opinion that another species, established by the same author from a fragment of a specimen, may also require to be transferred to a new genus.

Gen. **Gnathia,** Leach, 1814.

Syn: *Anceus,* Risso (male).
„ *Praniza,* Latr. (larva).

Generic Characters.—Body in male subdepressed, and more or less dilated in front, with the cephalon very large, subquadrangular, and flattened anteriorly, mesosome divided by a more or less conspicuous constriction into 2 sections, the anterior comprising 2, the posterior 3 well-developed segments, the foremost rudimentary segment being consolidated with the head, the hindmost received between the projecting lateral parts of the 5th segment. Body in female and larva more or less fusiform, with the cephalon rather small, and some of the segments of mesosome fused together. Metasome in both sexes, as also in the larva, much narrower than the mesosome, sublinear in form. Eyes, when present, placed laterally. Antennæ comparatively short and subequal in length, both pairs with distinctly defined flagella. Mandibles in male of different form ind the different species, more or less flattened, forceps-like. Maxillipeds without epignaths, masticatory lobe simple, palp consisting of 4 flattened joints fringed outside with strong plumose setæ; those in female much smaller, but of a similar structure. Oral parts in the larva combined into a rostrum-like cone projecting in front, and in a great measure styliform. Gnathopoda in male forming a pair of very large curved plates arching over the lower face of the cephalon, and terminating in a small apical joint; those in female much smaller and more pediform, being divided into 3 or 4 joints, and having at the base a thin lamella. Pereiopoda subequal and of normal structure. Pleopoda with the rami uni-articulate, tipped with long setæ, or quite naked (in the adult animal). Uropoda with both rami lamelliform, subequal, and edged with slender bristles.

Remarks.—This genus was established as early as in the year 1814 by Leach under the above name, which, according to the rules of priority, must be preferred to the more generally used terms *Anceus* (the male) and *Praniza* (the larva). To the French zoologist, E. Hesse, is due the merit of first having made out precisely the true relationship between the male, female, and larva, which had not formerly been fully recognized, though Leach had already conjectured, that the

Praniza might be the female of *Anceus*. Indeed, the 3 forms are so widely different both in their general appearance, and in the structure of some of the appendages, that one may be easily led to suppose that they belonged to as many distinct genera. The communications of M. Hesse therefore at first occasioned no little discussion among Corcinologists, and the correctness of his observations relating to the transformation of *Praniza* into *Anceus*, was even simply denied[1]); but subsequent investigations have, on the whole, fully confirmed his statements about the peculiar trimorphism occurring in this genus. A rather large number of species, amounting to more than 20 in all, have been recorded from different parts of the Oceans; but the far greater part of them have been only described from male specimens. To the fauna of Norway belong 4 species, to be described below.

1. Gnathia maxillaris (Mont.).

(Pl. XXI, Pl. XXII, fig. 1.)

Cancer maxillaris, Montague, Trans. Linn. Soc., Vol. VII, p. 65, Pl. 6, fig. 2.

Syn: *Anceus maxillaris*, Lamk. ♂.
„ *Praniza coeruleata*, Desm. (Larva).
„ *Anceus oxyuræus*, Lilljeb. ♂.
„ *Praniza Edwardii*, Sp. Bate ♀.
„ ? *Anceus manticorus*, Hesse.

Specific Characters.—Male. Body almost clavate in shape, being gradually expanded in front, with the anterior part of mesosome divided from the posterior by a rather deep constriction. Cephalosome transversely quadrate, deeply excavated above in its anterior part, dorsal face smooth and distinctly areolated, supraocular denticle comparatively small. Posterior division of mesosome narrower than the anterior, dorsal face quite smooth, without any areolation. Eyes well developed. Mandibles rather large, broadly lanceolate, with a slight obtuse notch outside, inner edge bulging in the middle, and obscurely crenulated in its outer part, tip scarcely incurved. Pereiopoda with scattered tubercles inside the outer joints. Pleopoda well developed, natatory. Uropoda with the rami foliaceous, and fringed with long ciliated setæ. Terminal segment of metasome triangular, gradually tapering to a point carrying 2 slender bristles. Sexual tubercle small, but little prominent. Colour yellowish brown, with the areolæ of the head whitish, defined by narrow dark brown grooves.—*Female:* Body oblong fusiform, with the 2

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[1]) It may be noted that the strange controversy which at first took place between M. Hesse and Mr. Sp. Bate, was merely due to the fact that the latter author regarded the adult female as a *Praniza*, whereas M. Hesse more correctly named it a female *Anceus*.

posterior pedigerous segments coalesced. Cephalosome obtusely produced in front, being fully as long as it is broad at the base. Pleopoda, as in male, natatory. Body whitish, mottled all over with reddish brown specks. Length of male 5 mm., of female about the same.

Remarks.—The identification of this form with Montagu's species is somewhat doubtful; but as, at least off the coasts of Norway, it is by far the most common species, I am much inclined to believe, that it is the form originally described as *Cancer maxillaris.* The form recorded by Sp. Bate & Westwood under this name is a very different species, showing in some respects a closer relationship to the following species, though apparently specifically distinct. The present species may be easily distinguished in both sexes from the 3 other Norwegian species, the male especially being readily recognized by the very large lanceolate mandibles, and by the very pronounced areolation of the dorsal face of the head, the female, by the form of the cephalosome.

Occurrence.—I have met with this form rather abundantly along the whole south and west coasts of Norway, from the Christiania Fjord up to the Lofoten Islands, in depths varying from 20 to 100 fathoms, and generally on muddy bottom, Male specimens are much more frequent than female ones, both being always found slowly creeping on the bottom. The larvæ (*Praniza*) are much more agile, and are often seen swimming about with great speed. Occasionally I have found them clinging to the skin of living fishes of various kinds, when just brought up by the fishing-line. In such cases, the posterior part of the mesosome generally forms a greatly swollen, unsegmented division (see Pl. XXII, fig. 1) filled with the blood of their hosts, and this is, on the whole, invariably the case with more advanced larvæ, even when taken up by the dredge. In all probability, they all lead a true parasitic existence, but being well fitted for swimming, they may at times leave their hosts. I have once witnessed the transformation of a *Praniza* (larva) into the adult male form (*Anceus*). Immediately after the transformation, the integuments of the animal were still rather soft, semipellucid, and mottled all over with reddish brown specks, as in the larva, without as yet showing the distinct areolation of the dorsal face of the head, which distinguishes the fully grown male.

Distribution.—British Isles (Mont.), Kattegat (Meinert), coast of France (Hesse).

2. **Gnathia dentata,** G. O. Sars.

(Pl. XXII, fig. 2.)

Anceus dentatus, G. O. Sars, Undersøgelser over Hardangerfjordens Fauna I. Chr. Vid. Selsk. Forh. 1871, p. 32.

Specific Characters.—Male: Body comparatively more elongated than in *G. maxillaris,* and less clavate in form, with the posterior division of mesosome scarcely narrower than the anterior, both being defined by a very conspicuous constriction. Cephalosome rounded quadrangular, with the supra-ocular processes rather prominent, dorsal face, behind the anterior excavation, evenly convex, without any areolation, but, like the first 2 segments of mesosome, clothed all over with very small spikes and stiff hairs. Posterior division of mesosome quite smooth, middle segment divided dorsally into 2 areolæ, separated by a rather broad membranous space. Metasome comparatively shorter and broader than in *G. maxillaris,* with the epimera triangularly produced. Eyes well developed. Inferior antennæ with the last joint of the peduncle rather large, subfusiform. Mandibles much smaller than in *G. maxillaris,* with a very conspicuous tooth-like projection in the middle of the outer edge, tip slightly incurved, acuminate, inner edge distinctly crenulated, and obtusely produced near the base. Pereiopoda without any distinct tubercles inside the outer joints. Pleopoda well developed, natatory. Terminal segment of metasome triangular and rather broad. Uropoda with the rami well-developed, foliaceous. Sexual process very long, pointing anteriorly. Colour greyish white.—*Female:* Body rather narrow with the 3 posterior pedigerous segments completely coalesced, and forming together an oblong, subcylindric division, more than 4 times as long as that preceding it. Cephalosome very small, twice as broad as it is long, front but very slightly produced, minutely bidentate at the tip. Pleopoda, as in the male, natatory. Colour yellowish white, mottled with scattered reddish specks. Length in both sexes 4 mm.

Remarks.—The present species may be easily distinguished from the preceding one, in the adult state of both sexes, whereas the larvæ are of a very similar appearance to those of *G. maxillaris.* In the male, the structure of the mandibles and the non-areolated dorsal face of the head may serve as easily recognizable distinguishing marks; in the female, the very different shape of the cephalosome, and the complete fusion of the posterior dilated segments of the mesosome.

Occurrence.—This form was first observed by the present author in the inner part of the Hardanger Fjord, and has subsequently been found occasionally in a few other places on the west coast of Norway, as also in the Trondhjem Fjord. It generally occurs on a stony bottom among Hydroida, the depth varying from 20 to 50 fathoms. In habits it exactly agrees with the type species.

3. **Gnathia elongata**, Kröyer.

(Pl. XXIII, fig. 1.)

Anceus elongatus, **Kröyer, Nat. Tidsskr. Ny Række, Bd. II, p. 388.**

Specific Characters.—Male: Body rather elongated, with the mesosome of nearly uniform breadth throughout, and the median constriction not very much pronounced. Cephalosome of moderate size, rounded quadrangular, with the supra-ocular processes well-defined. Dorsal face of both cephalosome and mesosome very uneven, with irregular depressions, and clothed all over with minute spinules and short hairs. Penultimate pedigerous segment divided dorsally by a narrow longitudinal groove into 2 halves. Metasome comparatively narrow, and scarcely longer than the 2 posterior pedigerous segments combined, epimera small. Eyes well-developed, though not very large. Mandibles comparatively small, with only a very slight notch outside, inner edge obtusely produced in the middle, tip acute, slightly incurved. Pereiopoda with small tubercles inside the outer joints. Terminal segment of metasome considerably narrowed in its outer part, which is conical in shape. Uropoda with the rami comparatively narrow.—*Female:* Body much broader than in male, with the last 3 pedigerous segments well-defined, and together forming an oblong oval division about 3 times as long as that preceding it. Cephalosome with the frontal part slightly produced and bidentate at the tip. Pleopoda in both sexes with the rami quite smooth forming narrow sac-like plates not fitted for swimming, but apparently respiratory in character. Colour of male greyish white, with a light bluish tinge, of female, yellowish, semipellucid, with scattered brown dots. Length in both sexes 4 mm.

Remarks.—This form was first described by Kröyer from male specimens collected off the Greenland coast, and was subsequently figured in Gaimard's great work. The female, however, has hitherto been unknown. Both sexes are easily distinguishable from those of the other Norwegian species. The immature form (Praniza), however, looks very like that of the 2 preceding species.

Occurrence.—Along the whole Finmark coast, this arctic form is not infreguently met with. In the harbour of Hammerfest especially, I have taken it in great abundance at a depth of from 20 to 40 fathoms, both sexes occurring in nearly equal numbers, and in the same place, larvæ (the Praniza-form) were also found rather plentifully. It extends southwards to the Lofoten Islands; farther south, I have never met with it. The adult animal is very sluggish in habit, the structure of the pleopoda, indeed, showing it to be quite unable to swim. The larvæ, on the other hand, move through the water with great agility, and most probably, at times, lead a parasitic life on the skin of various fishes.

Distribution.—Greenland (Kröyer), the Kara Sea (Hansen), St. 223 & 290 of the Norwegian North Atlantic Expedition.

4. Gnathia abyssorum, G. O. Sars.

(Pl. XXIII, fig. 2.)

Anceus abyssorum, G. O. Sars, Undersøgelser over Hardangerfjordens Fauna, Crustacea, p. 34.

Specific Characters.—Male: Body very short and stout, subclavate in form, with the posterior division of mesosome somewhat narrower than the anterior, both being defined by a well-marked constriction. Cephalosome exceedingly large, rounded quadrangular in shape, with the supra-ocular processes well-defined and coarsely denticulate, dorsal face, like that of the anterior part of mesosome, clothed with small spinules and scattered hairs. Penultimate pedigerous segment divided dorsally into 2 lateral areæ by a rather broad median, soft-skinned space, last segment considerably narrower, with the lateral corners obtusely produced. Metasome comparatively short, with simple, rounded epimera. Eyes unusually large, with light yellowish pigment. Mandibles powerfully developed, and pronouncedly securiform in shape, outer edge perfectly smooth, without any notch, inner, produced at the base to a large, obtusely conic expansion, tip pointed. Pereiopoda coarsely spinous inside. Terminal segment of metasome abruptly contracted in its outer part, which is narrowly conic in form. Uropoda with the rami comparatively narrow.—*Female:* Body fusiform, with the 3 posterior pedigerous segments well defined, and forming together an oval division, two and a half times as long as that preceding it. Cephalosome triangular, front rather produced, and bidentate at the tip. Pleopoda in both sexes not natatory, rami narrow sacciform, the outer one considerably shorter than the inner. Colour of male bluish white, of female whitish pellucid, without pigmentary spots. Length in both sexes about 3 mm.

Remarks.—This form was at first observed by the present author only in the female sex; but subsequently I have also succeeded in finding the male, and am thus enabled to draw up a complete diagnosis of the species. The discovery of the male has shown this species to be very nearly allied to the form described by the present author from the Norwegian North Atlantic Expedition as *Anceus robustus;* but the present species is of much inferior size, and of a still shorter and more compact form, differing, moreover, in the shape of the mandibles, and in the larger size of the eyes. By the 2 latter characters, it is also easily distinguishable from the 3 other Norwegian species.

Occurrence.—A single female specimen of this form was first taken in the inner part of the Hardanger Fjord, at Utne, from the considerable depth of

200 fathoms. Some years afterwards, I met with this species in a widely distant locality, viz., at Hasvig, West Finmark, where a few specimens, males and females, were taken from depths of from 150 to 200 fathoms.

Fam. 3. Ægidæ.

Characters.--Body more or less broad, depressed, with the dorsal face evenly vaulted and very smooth. Cephalon comparatively small, transverse, front not produced above the bases of the antennæ. Segments of mesosome well-defined and closely crowded together, all, excepting the 1st, having distinct coxal plates firmly connected with them laterally. Metasome composed of 6 well-defined segments, the last large, scutiform, and ciliated at the edges, constituting together with the uropoda a well-developed caudal fan. Eyes, when present, large, extending more or less over the dorsal face of the head. Antennæ pointing laterally, the superior ones shorter than the inferior, and originating close together in front of them; both pairs provided with distinctly-defined, multiarticulate flagella. Oral parts of rather anomalous structure, being modified for piercing and tearing the skin of other animals. The first 3 pairs of legs short and thick, prehensile, terminating in a strongly curved, hook-like dactylus, the 4 posterior pairs more slender, and ambulatory in character. Pleopoda with the rami large, foliaceous, ciliated at the edges, serving partly for swimming, partly for respiration. Uropoda attached laterally beneath the base of the terminal segment, and having the rami of coarser structure, and partly fringed with spines. Sexual difference not very pronounced.

Remarks.—This is one of the 6 families comprised within the large group *Cymothoidæ,* and is chiefly distinguished from the other families by the comparatively broad, flattened body, and by the structure of the antennæ and oral parts. All the forms belonging to this family lead a parasitic existence, being generally found clinging to the skin of fishes of different kinds, though they are pretty well adapted for moving freely about by the aid of the largely developed pleopoda. Four or 5 genera are comprised within this family, 3 of which are represented in the fauna of Norway.

Gen. 1. **Æga,** Leach, 1815.

Generic Characters.—Body rather compact, with very hard integuments, and the segments of mesosome nearly equal in size, the 4 posterior ones generally having a line running across them dorsally. Coxal plates thick, sculptured outside with 2 curved ridges, and produced posteriorly to an acute point. Metasome not much narrower than the mesosome, its 5 anterior segments very short, and having the epimera acutely produced. Eyes large, reniform, sometimes approaching dorsally, so as to meet in the middle. Superior antennæ rather short, with the first 2 peduncular joints more or less expanded. Anterior lip having in front a smooth linguiform plate (epistome) projecting between the bases of the inferior antennæ. Posterior lip terminating in 2 comparatively small, lanceolate lappets. Mandibles having at the base outside a well-developed 3-articulate palp, inner part of the body greatly produced, and terminating in a sharpened, knife-shaped cutting edge, molar expansion wanting. Anterior maxillæ with only a single narrrow masticatory lobe tipped by short spines. Posterior maxillæ broader, sublamellar, terminating in 2 unequal lobes armed with recurved denticles. Maxillipeds rather strong, epignath confluent with the basal part, masticatory lobe rudimentary, terminal part (palp) 5-articulate, incurved, subtortuous, and armed with strong recurved denticles. Anterior pairs of legs with the propodos simple cylindric, not expanded, dactylus abruptly curved in the middle, and terminating in a very acute point; the 4 posterior pairs successively increasing in length, with the propodal joint short, and the dactylus comparatively small. Uropoda with the basal part produced at the inner corner to a narrow lanceolate process.

Remarks.—This genus was established as early as in the year 1815 by Leach, and represents the type of the family *Ægidæ.* It is chiefly distinguished from the other 3 genera represented in the Norwegian fauna, by the comparatively broad metasome, the large reniform eyes, the structure of the antennæ and that of the mandibles and maxillipeds. Moreover, some differences are found in the structure of the legs. The Ægæ comprise some of the largest known Isopoda, and are well known by our fisher-men by their frequent occurrence on the skin of fishes of various kinds. They are generally named here in Norway "Fisk-Bjørn", that is, fish-bear. The genus comprises rather a large number of species from different parts of the Oceans, amounting to more than 20 in all. To the fauna of Norway belong 7 species, to be described below.

1. Ægga psora (Lin.).

(Pl. XXIV.)

Oniscus psora, Linné, Fauna svecica, ed. II, 1761.

Syn: *Ægga emarginata*, Leach.

Specific Characters.—Body rather broad, oval in form, about twice as long as it is broad, with the dorsal face but slightly vaulted, and very smooth and polished; transverse lines of the 4 posterior pedigerous segments indistinct. Cephalon with the front slightly produced in the middle. Coxal plates of moderate size. Metasome about half the length of the mesosome, epimera well-developed and pointed. Terminal segment triangular, pointed at the tip, dorsal face smooth. Eyes subreniform, separated in the middle by a distinct, though rather small interspace. Superior antennæ with the first 2 peduncular joints rather broad, the 2nd being produced at the end anteriorly to a hood-like projection curving over the succeeding joint, flagellum about half the length of the peduncle. Inferior antennæ nearly twice as long as the superior, with the flagellum somewhat longer than the peduncle. 1st pair of legs with only 2 blunt spines at the end of the meral joint inside, the 2 succeeding pairs with a row of from 7 to 8 similar spines on the same joint; the 4 posterior pairs with the outer part densely clothed with short spines. Uropoda with the inner plate deeply emarginated near the end, outside, outer plate oblong, with about 12 short spines along the exterior edge. Colour light reddish brown. Length of adult animal reaching to 50 mm.

Remarks.—This is the species first recorded, and may accordingly be regarded as the type of the genus. It is easily recognizable by the rather broad, oval body, the distinctly separated eyes, and more especially by the form of the terminal segment of the metasome, and the deep emargination occurring on the inner plate of the uropoda, outside the tip. The name *emarginata* proposed by Leach, was, indeed, derived from this last character.

Occurrence.—This species occurs rather frequently along the whole coast of Norway, from the Christiania Fjord to Vadsö, being more generally found on the cod, but occasionally also on other kinds of fishes, for instance the haddock, the ling, the halibut and the shark. It is also not infrequently taken up in the dredge, but, as a rule, only young specimens are caught in this manner.

Distribution.—British Isles (Sp. Bate), Kattegat (Meinert), North Sea (Metzger), Ireland (Edwards), Spitsbergen (Miers), Greenland (Lütken), Atlantic coast of North America (Harger).

2. **Ægа tridens,** Leach.

(Pl. XXV, fig. 1.)

Æga tridens, Leach, Trans. Linn. Soc. Vol. XI, p. 370.

Specific Characters.—Body somewhat more elongated than in the preceding species, being nearly 2 and a half times as long as it is broad. Cephalon rather broad in proportion to its length, and slightly produced in front. Mesosome moderately convex above, and quite smooth, though having the transverse lines of the 4 posterior segments very distinctly marked. Metasome rather broad, with projecting epimera; terminal segment subtriangular, with the tip bi-sinuate, or projecting in 3 obtuse dentiform projections, dorsal face with 3 obtuse carinæ, the median one rather narrow, the other 2 gradually widening in front. Eyes, antennæ, and legs nearly as in *Æ. psora.* Uropoda with the inner plate obliquely truncated at the tip, and devoid of any emargination outside. Length 38 mm.

Remarks.—This form, established by Leach, is nearly allied to the preceding species, though easily distinguishable by the shape and sculpturing of the terminal segment of the metasome, and by the absence of a sinus outside the inner plate of the uropoda. It is also of a somewhat more oblong form than the said species.

Occurrence.—Two specimens of this form are preserved in our University Museum, having been taken in the Christiania Fjord from the skin of the common cod. It has also been taken occasionally at Bergen and at Christiansund, but seems, on the whole, to be very rare. I have not myself observed it in a living state.

Distribution.—British Isles (Leach), Faroe Islands (Schödte & Meinert).

3. **Æga Strömii,** Lütken.

(Pl. XXV, fig. 2.)

Æga Strömii, Lütken, Vid. Medd. Nat. For. Kjøbenhavn 1858, p. 68, Pl. I. A, fig.s 6—8.

Syn: *Æga monophthalma,* var., Johnst.
„ „ *bicarinata,* Rathke (not Leach).

Specific Characters.—Body oblong oval, more than 2 and a half times as long as it is broad, and rather convex above. Cephalon moderately broad, slightly produced in front. Mesosome with the dorsal face smooth, transverse lines of the 4 posterior segments well defined. Terminal segment of metasome narrowly truncated at the tip, with the posterior edge very slightly emarginated, dorsal face with 2 rather slight and obtuse carinæ gradually disappearing in front, edges smooth, finely ciliated. Eyes very large, meeting above in the middle, along a straight line. Antennæ about as in the 2 preceding species. Anterior pairs of legs rather strong, with the meral joint slightly sinuated inside, posterior pairs not much elongated. Uropoda as in *Æ. tridens*. Colour of a young specimen: light yellow, with scattered reddish specks; posterior part of mesosome dark bluish with opaque white pigmentary ramifications in the middle of the segments. Length of adult animal reaching to 48 mm.

Remarks.—According to prof. Lütken, the form recorded by Ström in his description of Söndmöre, as "Fiskebjørn", is undoubtedly referable to this species. The same form was subsequently observed off the British Isles by Johnston, but was only regarded as a variety of his *Æ. monophthalma*. H. Rathke referred the species erroneously to *Æ. bicarinata* Leach, which is a very different species not yet found on the coasts of Norway. Under such circumstances, the name *Æ. Strömii*, proposed by Lütken, ought to be retained for the species. It is easily distinguishable from the 2 preceding species by the very large eyes, which meet along the median line; and also by the shape of the terminal segment of the metasome.

Occurrence.—The species would seem to occur not infrequently along the whole south and west coasts of Norway, and extends northwards at least to the Lofoten Islands. It is generally found on the skin of the common cod, but, as is the case with several other species, it seems also to infest several other kinds of fishes. I have myself taken it in the Trondhjem Fjord, from the haddock and from the common picked dog-fish (Acanthias).

Distribution.—British Isles (Johnston), Skagerak (Schödte & Lütken), Faroe Islands (Lütken).

4. **Æga crenulata**, Lütken.

(Pl. XXV. fig. 3.)

Æga crenulata, Lütken, Vid. Medd. Nat. For. 1858, p. 70, Pl. 1. A, figs. 4, 5.

Specific Characters.—Very like the preceding species, but of larger size and coarser structure, the dorsal face being finely scabrous, owing to numerous small, depressed pits, and having the transverse lines of the 4 posterior pedigerous segments very distinctly marked. Coxal plates rather large, and less acutely produced posteriorly. Metasome rather broad, with the epimera of the anterior segments projecting beyond the sides of the mesosome; terminal segment narrowly truncated at the tip, with the posterior edge nearly straight, and distinctly crenulated, upper face plain, without a trace of carinæ. Eyes large, meeting above along the median line. Antennæ about as in *Æ. Strömii*. The 3 anterior pairs of legs, on the other hand, distinguished by a very conspicuous cultriform spine, issuing from the end of the propodos, inside the base of the dactylus. Posterior pairs of legs and uropoda nearly as in *Æ. Strömii.* Length of adult animal reaching to 52 mm.

Remarks.—The present species, established by Prof. Lütken, is very nearly allied to *Æ. Strömii,* and may easily be confounded with it. On a closer examination, it is, however, found to differ in the much coarser sculpturing of the dorsal skin, and the entire absence of any keels on the terminal segment of the metasome, the posterior edge of which, moreover, exhibits a pronounced crenulation, not found in *Æ. Strömii.* The peculiar cultriform spine issuing from the end of the propodos of the 3 anterior pairs of legs, affords another character, by which this species is distinguished from all the other Norwegian forms. It is the largest of our indigenous Ægæ.

Occurrence.—Several specimens of this species are preserved in our University Museum, having been procured from time to time, partly in the Christiania Fjord, partly off the south coast of Norway. It has, moreover, been observed at Bergen, in the Trondhjem Fjord and in Komag Fjord, West Finmark. In every instance, it has been taken from the skin of the great shark (Scymnus microcephalus).

Distribution.—Iceland (Lütken), Greenland (Lütken).

5. Æga monophthalma, Johnston.

(Pl. XXVI, fig. 1.)

Æga monophthalma, Johnston, Loud. Mag. Nat. Hist. VII, p. 233, fig. 43.

Specific Characters.—Body oblong oval, much depressed, somewhat widening behind, dorsal face coarsely sculptured with depressed pits more distinct on the posterior part, hind edges of the segments crenulated. Cephalon very broad in proportion to its length, semilunar in shape, front somewhat produced. First segment of mesosome with the anterior edge emarginated on each side, to receive the ocular parts of the head. Coxal plates rather strongly produced, the last pair reaching almost as far as the epimera of the anterior segment of metasome. Anal segment semi-oval, terminating in a well-marked conical projection, dorsal face very coarsely sculptured, and somewhat excavated on each side, having a distinct, though obtuse, carina running along the middle. Eyes exceedingly large, oblong, meeting in front. Superior antennæ with the 1st peduncular joint very large and expanded, 2nd hood-shaped. Epistomal plate sub-pentagonal in form. Legs and uropoda af normal structure. Length of adult animal 50 mm.

Remarks.—This is a very distinct species, easily recognizable by the coarse sculpturing of the dorsal skin, the very large, oblong, contiguous eyes, the greatly expanded 1st and 2nd peduncular joints of the superior antennæ, and the form of the terminal segment of the metasome. According to Messrs. Schödte and Lütken, it sometimes attains a length of more than 56 mm., and is thus probably the largest of all hitherto known Ægæ.

Occurrence.—A few specimens of this pretty form are preserved in our University Museum, some having been procured in the Christiania Fjord, some at Farsund, on the south coast of Norway. It has, moreover, been found at Bergen, at Florö, and in the Trondhjem Fjord. The specimens have been taken, some from the skin of the common cod, some from that of the great shark.

Distribution. — British Isles (Johnston), Skagerak (Meinert), Iceland (Schödte & Lütken).

6. **Æga arctica,** Lütken.

(Pl. XXVI, fig. 2.)

Æga arctica, Lütken, Vid. Medd. Nat. Hist. Foren. 1858, p. 71, Pl. 1. A., figs. 1—3.

Specific Characters.— Body oblong oval, with the dorsal face moderately convex, and very smooth. Cephalon but little more than twice as long as it is broad, front slightly produced in the middle. Mesosome with the transverse lines of the 4 posterior segments not very sharply marked; coxal plates of moderate size. Metasome rather large, considerably exceeding half the length of the mesosome, epimera bluntly produced; terminal segment semioval, tip evenly rounded, with a very small apical incision, dorsal face plain, edges in the outer part minutely serrated. Eyes of middle size, oval, separated above by a distinct, though small interspace. Antennæ unusually slender, the first 2 peduncular joints of the superior ones but slightly expanded, and, combined, scarcely longer than the last peduncular joint. Legs and uropoda normal. Length of an apparently adult specimen 32 mm.

Remarks.—This species, established by Prof. Lütken, may be easily distinguished from those previously described by the slender form of the antennæ, the comparatively large size of the metasome, and the shape of its terminal segment.

Occurrence.—A single specimen of this form is preserved in our University Museum, having been procured in Finmark, probably from the skin of the great shark.

Distribution.—Greenland (Lütken), Iceland (Schödte & Meinert).

7. Æga ventrosa, M. Sars.

(Pl. XXVI, fig. 3.)

Æga ventrosa, M. Sars, Chr. Vid. Selsk. Forh. 1848, p. 156.

Syn: *Æga Lovéni,* Bovallius.
„ *Ægiochus ventrosus,* Bov.
„ — *Nordenskjöldi,* Bov.

Specific Characters.—Body rather broad, oval in form, with the dorsal face slightly vaulted and quite smooth. Cephalon of moderate size, with the front, as usual, slightly produced in the middle. Coxal plates of usual structure. Metasome exceeding half the length of the mesosome, epimera acutely produced; terminal segment subtriangular, produced at the tip to an obtuse point, dorsal face plain, outer part of the edges distinctly serrated, and armed with minute spinules. Eyes rather narrow, separated in the middle by a distinct interspace. Antennæ very slender, resembling those in *Æ. arctica,* though the flagellum of the superior ones is somewhat longer. Anterior pairs of legs with the inner edge of the meral joint sinuated, and only armed with scattered small denticles. Uropoda with both plates distinctly serrate and denticulate, the inner one broader than the outer, and having a very slight emargination outside the tip. Colour pale yellowish, sometimes with a tinge of chestnut. Length of adult animal 23 mm.

Remarks.—I fully agree with Dr. Hansen in believing the 3 forms recorded by Dr. Bovallius as *Æga Lovéni, Ægiochus Nordenskjöldi* and *Ægiochus ventrosus,* to belong to one and the same species. The genus *Ægiochus* cannot be maintained, as, according to Dr. Hansen, it is only founded upon a spurious character, caused by an imperfect exuviation of some specimens. The differences pointed out by Dr. Bovallius between the 3 forms, appear, on the whole, to be quite insufficient as specific distinctions. The present species, first described by my late father, agrees with *Æ. arctica* in the structure of the antennæ, but is of rather inferior size, and, moreover, has the body comparatively broader, the eyes much narrower, and the terminal segment of the metasome of rather a different shape.

Occurrence.—The species would seem to occur not infrequently along the whole Norwegian coast, from the Christiania Fjord to Komag Fjord in West Finmark. As far as I know, all the specimens secured have been taken by the aid of the dredge from rather considerable depths descending to 300 fathoms. It may, however, be assumed that, like the other species, it at times infests fishes of one kind or another.

Distribution.—Coast of Bohuslän (Bovallius), Greenland (Bovallius).

Gen. 2. **Rocinela,** Leach, 1815.

Syn: *Acherusia*, Lucas.

Generic Characters.—Form of body resembling that of *Æga,* though being somewhat less compact, and more depressed. Metasome generally less broad, with the terminal segment rounded off at the end, and finely ciliated. Eyes well developed, with very large and conspicuous corneæ. Antennæ slender, the superior ones much shorter than the inferior, and with the basal joints not expanded. Epistomal plate very small and narrow. Mandibles considerably produced, with the cutting edge expanded inside to a linguiform lamella (molar expansion?); palp well developed, with the basal joint much elongated. Maxillæ nearly as in *Æga.* Maxillipeds with the palp composed of only 2 joints, the terminal one armed with strong recurved teeth. The 3 anterior pairs of legs having the propodos more or less expanded and armed inside with strong spines, dactylus forming a very large and evenly curved hook; the 4 posterior pairs slender, resembling in structure those in *Æga.* Pleopoda and uropoda normal.

Remarks.—This genus, established by Leach, is nearly allied to *Æga,* though exhibiting some well-marked differences both in the structure of the oral parts, and in that of the anterior pairs of legs. The genus *Acherusia* of Lucas is undoubtedly identical with that of Leach. Nine species of the genus are recorded in the work of Schödte & Meinert, from different parts of the Oceans. Of these, only a single species is represented in the fauna of Norway.

Rocinela danmoniensis, Leach.

(Pl. XXVII.)

Rocinela danmoniensis, Leach, Dict. sc. nat. XII, p. 349.

Syn: *Acherusia rotundicauda,* Lilljeb.

Specific Characters.—Body somewhat varying in form, being, in sexually developed specimens of both sexes, comparatively broader and more compact than in younger, though equally large specimens, in which the 4 posterior segments of mesosome are particularly large, and defined by rather broad, thin-skinned interspaces. Cephalon subtriangular in form, being produced in front to an obtuse point. Coxal plates acutely produced, with the outer face smooth. Metasome defined from the mesosome by a conspicuous constriction, and of inferior breadth, 1st segment in adult specimens nearly concealed, epimera acutely produced; terminal segment semi-oval, or broadly linguiform, evenly rounded at the end, dorsal face plain, outer part of edge finely ciliated, and armed with minute adpressed spinules. Eyes very large, nearly quadrangular, almost meeting above at one of their angles. Superior antennæ with the 1st joint of the peduncle rather short and concealed by the produced front, flagellum shorter than the peduncle and 6-articulate. Inferior antennæ more than twice as long as the superior, flagellum considerably exceeding the peduncle in length. Anterior pairs of legs rather strong, meral joint armed inside with 3 blunt spines, propodos rather broad, with 3 strong spines inside, dactylus large falciform. Uropoda with both plates oblong, densely ciliated, and partly edged with short spinules, the inner one a little broader than the outer, and rounded at the tip. Colour light reddish brown, caudal fan sub-hyaline. Length of adult animal reaching to 24 mm.

Remarks.—This form was described under the above name by Leach as early as in the year 1815. Subsequently it was recorded from the Norwegian coast by Prof. Lilljeborg under another name, viz., *Acherusia rotundicauda.* It looks, on the whole, very like an *Æga,* but may be at once distinguished by the more depressed, and less compact body, the large angular eyes, and the evenly rounded terminal segment of the metasome. Not yet sexually developed specimens are more frequently met with, and in these the body appears much more slender than in adult specimens, in which it is considerably shortened by the closer crowding together of the segments.

Occurrence.—The species occurs not infrequently along the whole south and west coasts of Norway, at least to the Trondhjem Fjord, and is not infrequently taken up in the dredge, though it is more generally found clinging to the skin of fishes of various kinds, for instance the common cod, the haddock, the ling etc.

Distribution.—British Isles (Leach), Öresund and Kattegat (Meinert), the Faroe Islands (Schödte & Meinert).

Gen. 3. **Syscenus,** Harger, 1878.

Syn: *Harponyx,* G. O. Sars.
„ *Rocinela,* Bovallius (not Leach).

Generic Characters.—Body depressed, with the cephalon comparatively small, and the metasome narrowing abruptly to a much smaller width than the mesosome; terminal segment very large. Eyes wanting. Antennæ nearly as in *Rocinela.* Mandibles with the cutting edge simple, acuminate, palp of moderate length. Maxillipeds with the terminal part bi-articulate. Anterior pairs of legs with the propodos smooth, cylindric, not expanded, dactylus extremely strong, hooked, abruptly curved in the middle, and terminating in a very sharp point. The 4 posterior pairs of legs very slender, with the propodal joint elongated, and the dactylus hook-shaped. Uropoda with the basal part but slightly produced inside, terminal plates comparatively narrow, setiferous.

Remarks.—This genus, established by O. Harger, is nearly allied to *Rocinela*, but differs in the total absence of eyes, and in the abruptly narrowed metasome, as also in the structure of the mandibles. In some other points, for instance, the strongly hooked pereiopoda, it seems to form a transition to the family *Cymothoidæ* (sens. strict.). The genus is as yet only represented by a single species.

Syscenus infelix, Harger.

(Pl. XXVIII.)

Syscenus infelix, Harger, Report on the marine Isopoda of New England. Rep. Un. St. Com. Fish & Fisheries Part VI, p. 387.

Syn: *Harponyx pranizoides*, G. O. Sars.
„ *Rocinela Lilljeborgii*, Bovallius.

Specific Characters.—Immature form: Body very slender and much depressed, with the anterior division oblong oval in form, the posterior one much narrower, and sublinear. Cephalon triangular, gradually narrowed in front to a somewhat projecting point. First segment of mesosome rather large, last segment much narrower than the preceding ones, and without coxal plates. Metasome fully as long as the mesosome, very slightly widening posteriorly, terminal segment about the length of the other 5 combined, and gradually tapering to an obtuse point carrying 2 juxtaposed spines, edges fringed with slender bristles. Superior antennæ with the flagellum about the length of the peduncle, and 5-articulate; inferior ones 3 times as long, with the flagellum twice the length of the peduncle, and composed of 11 articulations, clothed posteriorly with long and slender setæ. Anterior pairs of legs comparatively short and stout, with the dactylus enormously developed; the 3 posterior pairs very slender, and rapidly increasing in length, 6th pair about the length of the whole body, not including the caudal fan, propodal joint in all 3 pairs very much elongated, dactylus strong, hook-shaped. Last pair of legs wanting. Pleopoda with the lamellæ comparatively narrow, inner one of the posterior pair not ciliated. Uropoda with the basal part somewhat elongated, and produced inside to a rather short setiferous projection, terminal plates narrow oblong, and fringed with slender bristles, the outer one considerably smaller than the inner, and armed outside with a row of small spinules. Colour whitish, pellucid, cephalon tinged with light chestnut. Length 6 mm.

Remarks.—The above diagnosis refers only to the immature animal. In the adult state, this form was first described, but not figured, by O. Harger in the above-quoted paper from a solitary specimen taken north of Cape Cod, from a depth of 130 fathoms. Subsequently several more specimens were procured, and some additional remarks on the species, accompanied by a habitus-figure and some detail-figures, were given by the same author in another paper published in 1883. It may thereby easily be demonstrated, that the form described by Dr. Bovallius in the year 1885 as *Rocinela Lilljeborgii,* is the very same species, and, as, moreover, it must be regarded as beyond all doubt, that this form only represents a more advanced stage of the *Harponyx pranizoides* described in 1882 by the present author, all these 3 forms ought to be combined into one species, for which the name proposed by Harger, being the older one, must be retained. According to the latter author, the species grows to rather a large size, the largest specimen measuring 44 mm. in length. The specimen described by Dr. Bovallius had a length of 22 mm.

Occurrence.—Only 2 specimens of this form, both very young and exactly alike both in size and structure, have been examined by me. They were taken up by the dredge in 2 different localities of the west coast of Norway, viz., at Hvitingsö and at Bekkervig, the depth ranging from 80 to 150 fathoms.

Distribution.—Atlantic coast of North America (Harger), coast of Bohuslän, on the operculum of a whiting (Bovallius).

Fam. 4. Cirolanidæ.

Characters.—General habitus not unlike that in the *Ægidæ,* though the back is much more strongly vaulted, giving the body a more or less semicylindric form. Cephalon with the front not produced in the middle. Coxal plates well-defined on all the segments of mesosome except the 1st. Metasome normally developed, with the terminal segment large, clypeiform, constituting together with the uropoda a well-developed caudal fan. Eyes not very large, lateral. Antennæ very unequal, the superior ones being very small, the inferior long and slender. Oral parts formed for biting and masticating, and accordingly of more normal structure than in the *Ægidæ.* All legs ambulatory in character, though the 3 anterior pairs may also serve for prehension, and the posterior ones for swimming.

Pleopoda well developed, adapted both for swimming and breathing. Uropoda of a structure similar to that in the *Ægidæ.* Incubatory pouch composed of 5 pairs of lamellæ issuing from the bases of the 5 anterior pairs of legs; a supplementary pair of lamellæ originating moreover from the epignath of the maxillipeds. Second pair of pleopoda in male with a stylet inside the inner plate.

Remarks.—In outward appearance, the forms belonging to this family exhibit a great similarity to the *Ægidæ,* and were indeed formerly referred to the very same family. They are not, however, like the latter, parasitic in character, but lead a free existence, and it is chiefly to this difference in habits that the apparently very different structure of the oral parts, and partly also of the anterior pairs of legs, is due. In other anatomical characters, the close relationship between the 2 families may be easily observed. The family has been made the subject of a very thorough investigation by the well-known Danish zoologist, Dr. H. J. Hansen, and the reader may therefore be referred for a more detailed description to his admirable work, in which also the nearly-allied families, *Alcinoridæ, Corallanidæ* and *Barybrotidæ* are treated of in detail. The following 5 genera have been included within the present family: *Cirolana, Conilera, Bathynomus, Anuropus,* and *Eurydice.* Of these only the first and last are represented in the fauna of Norway.

Gen. 1. **Cirolana,** Leach, 1818.

Generic Characters.—Body more or less elongated, with the dorsal face strongly vaulted and perfectly smooth. Cephalon semicircular, with the frontal edge evenly arched. First segment of mesosome forming on each side a linguiform expansion advancing over the sides of the cephalon. Coxal plates of the succeeding segments well-defined, laminar, turned downwards. Penultimate segment of metasome without projecting epimera; terminal segment large, more or less narrowed distally, ciliated at the tip. Eyes placed widely apart on the sides of the cephalon. Superior antennæ very small, with the flagellum subfusiform, and composed of numerous very short articulations clothed with delicate sensory filaments. Inferior antennæ with the flagellum slender and elongated. Epistomal plate very narrow. Anterior and posterior lips normally developed. Mandibles very strong, with the cutting edge divided into a limited number of coarse teeth, and having, inside, a distinct denticulated secondary lamella, molar expansion narrow, ensiform, with a regular series of small denticles along the anterior edge, palp not very large. Anterior maxillæ with the masticatory lobe very large and broad, coarsely spinous at the tip, basal lobe small, carrying 3 densely plumose setæ. Posterior maxillæ terminating in 2 narrow setiferous lobes, and having inside a short densely setous masticatory expansion. Maxillipeds with the basal part quite short, epignath linguiform, pointing outwards, masticatory lobe small but distinct, with 2 curved hooks inside, palp large, 5-articulate, the joints complanated and densely setous. Legs with the joints more or less expanded, and edged with spines and bristles, dactylus comparatively short, not hook-shaped; the 3 anterior pairs of legs much shorter than the posterior, and turned forwards. First pair of pleopoda not much differing from the others. Uropoda with the basal part produced inside, outer plate narrower than the inner.

Remarks.—This genus was established by Leach as early as in the year 1818, and may accordingly be regarded as the type of the family. Its nearest ally is undoubtedly the genus *Conilera*, which, in almost all anatomical details, agrees very closely, except in the structure of the first pair of pleopoda. The genus comprises rather a large number of species from different parts of the Oceans, amounting to nearly 30 in all. To the fauna of Norway belong 2 species only.

1. Cirolana borealis, Lilljeb.

(Pl. XXIX.)

Cirolana borealis, Lilljeborg, Öfvers. Vet. Akad. Förh. 1851, p. 23.

Syn: *Cirolana spinipes,* Bate & Westw. (not M.-Edw.).

Specific Characters.—Body oblong oval, broadest in the middle, and gradually tapering both in front and behind. Coxal plates rather large and perfectly smooth. Metasome considerably narrower than the mesosome, with the terminal segment scarcely longer than the preceding ones combined, and subtriangular in form, tip bluntly produced and fringed with rather long ciliated bristles, having also 6—8 small marginal spinules. Eyes of moderate size and oval in form. Inferior antennæ more than 4 times as long as the superior, with the flagellum very slender and composed of about 30 articulations. Legs with the outer joints densely spinous, ischial and meral joints considerably expanded, and conically produced outside. Last pair of legs with the basal joint very broad, laminar, and densely fringed with delicate setæ, meral and carpal joints of moderate size, propodal joint much longer than the carpal one. Uropoda with the basal part produced inside to a comparatively short acute process, both plates armed with scattered spinules, the outer one narrow lanceolate, the inner somewhat broader, oblong oval, with the outer edge straight, the inner evenly curved. Body light flesh-coloured, mottled with darker brown. Length of adult animal reaching to 26 mm.

Remarks.—This species was first described by Prof. Lilljeborg under the above name from specimens taken off the west coast of Norway. The form subsequently recorded by Sp. Bate & Westwood from the British Isles as *C. spinipes* is undoubtedly the same species. It is nearly allied to the Mediterranean form, *C. neglecta* Hansen, though differing in its more elongated body, the smooth coxal plates, and the form and armature of the terminal segment of the metasome.

Occurrence.—The species occurs along the whole south and west coasts of Norway, at least to the Trondhjem Fjord, and is not infrequently taken up in the dredge together with other animals. I had, however, no idea of the great abundance of this form, until I tried another method of catching it, viz., small weels baited with dead fish. By these means, I have taken it in extraordinary numbers, and in one night, all the soft parts of the bait were generally completely torn off by them, so as to leave only the skeleton. Subsequently I have also taken it in great abundance in the Trondhjem Fjord, from dead fish fastened on the fishing lines. Indeed, it seems to be one of the most effective scavengers of the sea, excelling in this respect even the most voracious species of *Anonyx* among the Amphipoda.

Distribution.—British Isles (Sp. Bate), Kattegat (Meinert), Shetland Isles (Norman), coast of France (Bonnier), Mediterranean at Naples (Hansen), Atlantic coast of North America (Harger).

2. Cirolana microphthalma, Hoek.

(Pl. XXX, fig. 1.)

Cirolana microphthalma, Hoek, Die Crustaceen gesammelt während den Fahrten des „Willem Barents" in den Jahren 1878 und 79, p. 28, Pl. II, figs 13—17.

Syn: *Cirolana Cranchi*, G. O. Sars (not Leach.)
„ — *concharum*, G. O. Sars (not Stimpson).

Specific Characters.—Body oblong, semicylindric, considerably more than 3 times as long as it is broad, and slightly widening behind. Metasome scarcely narrower than the mesosome, 1st segment very short, nearly concealed, terminal segment large, exceeding in length the preceding ones combined, linguiform, abruptly narrowed behind the base, tip obtusely truncated and finely ciliated, having moreover 6 small marginal spinules. Eyes very small, rounded. Inferior antennæ comparatively short, scarcely more than twice as long as the superior, flagellum about the length of the peduncle, and composed of 12 articulations only.

Anterior pairs of legs nearly as in *C. borealis,* though somewhat less densely spinous; last pair rather different, the basal joint being scarcely at all expanded, and without the dense fringe of setæ found in *C. borealis,* meral and carpal joints rather large, but only sparsely spinous, propodal joint much shorter than the carpal one. Uropoda with the inner process of the basal part considerably produced, outer plate narrow lanceolate, and without any marginal spinules, inner one much broader, widening distally, with the tip blunted and the outer edge slightly emarginate near the end. Colour whitish. Length of an apparently adult specimen 10 mm.

Remarks.—This form was first recorded by the present author in 1872 as *C. Cranchi,* Leach. Subsequently, however, I found that it agreed much more closely with the North American species *C. concharum* Stimpson, and it was recorded under this name in the Report on the Crustacea from the Norwegian North Atlantic Expedition, as also in my synopsis of Crustacea of Norway. According to Dr. Hansen, who has studied the several species of this genus very carefully, it differs, however, in some particulars also from the North American species, so that it should more properly be regarded as a distinct species, for which the name proposed by Dr. Hoek in 1882 ought to be retained. From *C. borealis* it may be easily distinguished by its more oblong form, the small size of the eyes, the comparatively short inferior antennæ, the rather different structure of the last pair of legs, and finally by the form of the terminal segment of the metasome and that of the uropoda.

Occurrence.—Only 2 specimens of this form have hitherto been observed by me, the one being found, many years ago, inside the Storeggen bank, west coasst of Norway, the other being taken during the Norwegian North Atlantic Expedition. east of Vardö.

Distribution.—The Barents Sea (Hoek).

Gen. 2. **Eurydice,** Leach, 1815.

Syn: *Slabberina,* v. Beneden.

Generic Characters.—Body resembling in its external appearance that in the genus *Cirolana,* though having the metasome comparatively more fully developed, with the penultimate segment of same appearance as the preceding ones, and the terminal segment very large and broad. Eyes well developed, lateral.

Superior antennæ very small, with the first joint of the peduncle quite short, and extended straight in front, at a right angle to the remaining part of the antenna. Inferior antennæ very slender, with the last peduncular joint much elongated. Oral parts on the whole, resembling those in *Cirolana*. Anterior pairs of legs rather short and thick, the 4 posterior ones gradually increasing in length, and having the outer joints broad and compressed. Pleopoda of normal structure. Uropoda with the basal part only very slightly produced inside, rami comparatively broad, lamellar, and edged with long setæ.

Remarks.—This genus, established by Leach, is very nearly allied to *Cirolana,* though differing in some particulars, so as to justify its separation. The genus *Slabberina* of v. Beneden is undoubtedly identical with Leach's genus. We know of about 8 species, one of which belongs to the fauna of Norway, and will be described below.

Eurydice pulchra, Leach.

(Pl. XXX, fig. 2.)

Eurydice pulchra, Leach, Trans. Linn. Soc. XI, p. 370.

Syn: *Slabberina agata,* v. Beneden.
„ — *agilis,* G. O. Sars.
„ — *gracilis,* Bovallius.

Specific Characters.—Body in adult specimens rather short and stout, oval in form, and rather convex above. Cephalon evenly rounded in front. Coxal plates well defined, and quite smooth. Metasome about the length of the 5 posterior segments of mesosome combined, 1st segment very short, almost concealed; terminal segment very large, about the length of the preceding ones combined, and semi-oval in form, tip obtusely rounded, and armed with 4 minute spinules, being, moreover, fringed with small bristles. Eyes rather large, oval triangular, extending a little up the dorsal face. Superior antennæ with the flagellum 5-articulate, 1st joint much larger than the other 4 combined. Inferior antennæ, when reflexed, reaching almost to the end of the mesosome, last joint of the peduncle about the length of the preceding joints combined, flagellum extremely slender, and composed of about 20 articulations. Legs densely setiferous, and armed with scattered short spines; last pair with the meral and carpal joints much expanded, propodal joint about the length of the carpal one, but considerably narrower; dactylus in all pairs rather small. Uropoda with the basal part densely setous outside, and having a single bristle at the inner corner, terminal plates rather unequal, the inner one being much broader than the outer, and obliquely truncated at the end. Body ornamented dorsally with richly ramified, dark, pigmentary stars, arranged in transversal rows on the segments, and partly confluent. Length of adult animal 7 mm.

Remarks.—As pointed out by v. Beneden, this form was recorded by Slabber as early as in the year 1778, under the Dutch name "Agaat-Pissebet", and the specific name *agata* applied to this form by v. Beneden should therefore perhaps be preferred to that proposed by Leach (*pulchra*); but the Leachian name has been so generallyd used, that it would be inappropriate to change it. The form recorded by the present author as *Slabberina agilis,* is undoubtedly the same species, and I also fully agree with Dr. Hansen in regarding the *Slabberina gracilis* of Bovallius as only founded on a young specimen of the present species.

Occurrence.—I have observed this form rather plentifully in the inner part of the Trondhjem Fjord, at Levanger, where it occurred close to the shore in quite shallow water, swimming rapidly about between the stones in a manner very similar to that observed in the *Dytisci* and Gyrini. I have also taken it near the sandy beach of Listerland, and occasionally in the Christiania Fjord, at Laurkullen and Fredriksværn. According to Dr. Bovallius, the specimen described by him as *Slabberina gracilis,* was taken up in the dredge at Dröbak from a depth of 100 fathoms; but it is most probable, as opined by Dr. Hansen, that it did not come from this depth, but had entered the dredge during its uphauling.

Distribution.—British Isles (Leach), Kattegat (Meinert), Baltic at Kiel (Moebius), Dutch coast (v. Beneden), coast of France (Bonnier).

Fam. 5. Limnoriidæ.

Characters.—Body subdepressed, capable of being rolled into a ball. Cephalon short and very convex. Coxal plates behind the 1st segment of mesosome well defined, laminar. Metasome composed of 6 well-defined segments, the last of which is very large, clypeiform. Antennæ small, subequal in size. Oral parts on the whole normal, adapted for biting. Legs of uniform structure, all being ambulatory in character. Pleopoda well developed, serving both for swimming and breathing; 1st pair of same structure as the succeeding ones; 2nd pair in male with a lateral stylet on the inner plate. Uropoda comparatively small, lateral, rami not lamelliform.

Remarks.—This family, first established by O. Harger, is not difficult to distinguish from any of the preceding ones, whereas in certain points it exhibits an unmistakable likeness to the family *Sphæromidæ,* not represented in the fauna of Norway, and I had, indeed, formerly combined the two. There are, however, some distinguishing characters which make it advisable to keep the two families apart. On the other hand, I find it quite inadmissible to associate this family with the *Asellota,* as proposed by some authors. The full segmentation of the metasome, the uniform structure of the pleopoda, and the lateral position of the uropoda, prove it unquestionably to belong to the group *Flabellifera,* as here defined. The family comprises as yet but a single genus.

Gen. **Limnoria,** Leach, 1815.

Generic Characters.—Body oblong, rather convex above, with the segments sharply marked off from each other. Cephalon comparatively short and blunt in front, with the buccal mass very prominent below. First segment of mesosome longer than the other, and partly advancing over the cephalon. Coxal plates on the succeeding segments, rather large, deflexed, the posterior ones triangularly produced. The 5 anterior segments of metasome with well-developed, laterally projecting epimera; terminal segment broad, flattened above. Eyes wide apart, lateral. Antennæ with the flagella rather short. Mandibles very strong, cutting edge terminating in a conically compressed, chisel-shaped point, molar expansion wanting, palp rather small. Anterior maxillæ with the masticatory lobe conically tapering and coarsely spinous at the tip, basal lobe narrow, turned anteriorly, and carrying 3 short, ciliated apical setæ. Posterior maxillæ terminating in 3 setiferous lobes, the innermost representing the masticatory lobe. Maxillipeds slender, with the basal part rather elongated and narrow, masticatory lobe well developed, palp composed of 5 flattened joints, epignath lanceolate, turned anteriorly. Anterior pairs of legs somewhat shorter than the posterior, dactylus in all pairs provided inside with a secondary claw-like projection. Pleopoda with the rami lamellar, and, excepting the last pair, densely fringed with setæ. Uropoda with the outer ramus short, unguiform; inner, linear.

Remarks.—This genus was established by Leach in the year 1815, to include the peculiar little creature, whose destruction of pile-work and other submerged timber had long been known. He associated the genus with the *Cymothoidæ* and *Sphæromidæ,* thus recognizing its true relationship. We know, as yet, of only 3 species, one of which, *L. segnis* Chilton, has been found off New Zealand, the 2nd, *L. antarctica* Pfeffer, at the South Georgian Islands, the 3rd being widely distributed in the northern Ocean.

Limnoria lignorum (Rathke).

(Pl. XXXI.)

Cymothoa lignorum, Rathke, Skrifter af Naturh. Selsk. Vol. 10¹, Pl. 3, fig. 14.

Syn: *Limnoria terebrans*, Leach.
„ — *uncinata*, Heller.

Specific Characters.—Body, when fully extended, about 3 times as long as it is broad, and almost semi-cylindric in form, slightly tapering in front. Cephalon nearly globular, and partly covered above by the 1st segment of mesosome, front obtusely rounded. First segment of mesosome considerably longer than the others and rather deep, forming below, on each side, a rounded lobe projecting over the lateral faces of the cephalon. Coxal plates fringed with ciliated bristles, the 2 anterior pairs oval quadrangular; the 4 posterior ones considerably larger, and produced to an acute corner pointing backwards. Metasome considerably exceeding half the length of the mesosome, and scarcely narrower, epimera triangular, projecting laterally; terminal segment about the length of the other 5 combined, and very broad, almost elliptical in form, posterior edge evenly arcuate and finely ciliated. Eyes comparatively small, rounded, with a limited number of large corneæ. Superior antennæ somewhat stronger than the inferior, with the flagellum extremely small, 3-articulate, and carrying a dense fascicle of long sensory filaments. Inferior antennæ with the flagellum about half the length of the peduncle, and composed of 5 articulations, the 1st of which is much the largest. First pair of legs somewhat larger than the next succeeding ones, but otherwise of the very same structure, meral and carpal joints in most of the legs strongly tubercular inside. Last pair considerably more slender than the others, and without any tubercles. Dactylus in all legs distinctly bi-articulate, the 1st joint having at the end inside, a bidentate unguiform spine. Uropoda with the basal part strongly tuberculated outside, and projecting between the rami to an acute projection, outer ramus short, unguiform, turned outwards, inner sublinear, about the length of the basal part, and terminating in a dense bunch of slender bristles. Colour light greyish brown, with darker brown pigmentary ramifications. Length of adult animal 5 mm.

Remarks.—This form was described by Rathke as early as in the year 1799 as *Cymothoa lignorum.* By subsequent authors, it has generally been recorded under the name given to it by Leach, viz., *Limnoria terebrans.* The *Limnoria uncinata* of Heller, from the Adriatic, is undoubtedly identical with the northern species.

Occurrence.—I have found this form not infrequently in the Christiania Fjord, at Dröbak and Moss, boring in immerged pieces of wood. A single specimen was, moreover, taken by me many years ago at the Lofoten Islands. It thus appears that it occurs along the whole south and west coasts of Norway.

Distribution.—British Isles (Leach), Kattegat (Meinert), Dutch coast (Hoek), coast of France (Bonnier), Adriatic (Heller), Black Sea (Sowinsky), atlantic coast of North America (Harger).

Tribe 3.

VALVIFERA.

Remarks.—The chief character by which this group is defined from all other known Isopoda, consists in the peculiar structure of the uropoda, which, like a pair of folding doors, arch over the lower face of the metasome, thus forming a shelter for the delicate pleopoda, the latter being for the most part branchial in character, though the anterior pairs may at times also serve as swimming limbs for propelling the animal through the water. We only know of 3 families belonging to this tribe, viz., the *Idotheidæ, Arcturidæ* and *Chætiliidæ,* the last of which, however, is still very imperfectly known. The first 2 families are represented in the fauna of Norway, and will be treated of below.

Fam. 1. Idotheidæ.

Characters.—Body more or less depressed, with the segments of mesosome of uniform appearance, coxal plates sometimes distinctly defined, sometimes confluent with the segments. Metasome with some, or all of the segments consolidated to form a large terminal piece, carrying the normal number of pleopoda. Superior antennæ comparatively small, with the flagellum uni-articulate. Inferior antennæ more or less elongated, and originating outside the superior, from the lateral corners of the cephalon. Oral parts on the whole normal, though the mandibles are always without palps, and the joints of the maxillipeds are often reduced in number. Legs rather strongly built, increasing in length posteriorly, the 3 anterior pairs being sometimes pronouncedly subcheliform in structure. The anterior pairs of pleopoda with the rami densely setiferous, 2nd pair in male with the usual stylet. Uropoda very large, lamellar, valve-like, closing over the lower face of the metasome; outer part cut off by a transverse suture, and forming a separate plate, inside which sometimes occurs another much smaller plate. Incubatory pouch normal.

Remarks.—This family is chiefly distinguished from the *Arcturidæ* by the more or less broad, depressed body, the rather uniform segmentation of the mesosome, and the structure of the legs. Some of the largest known Isopoda are included in this family. Thus the huge *Glyptonotus antarcticus* measures no less than 3 inches and a half in length, and some of the arctic species of the genus *Chiridothea* are scarcely smaller. The family comprises about 10 genera, only one of which is represented in the fauna of Norway.

Gen. **Idothea,** Fabr., 1798.

Generic Characters.—Body oval or oblong, distinctly depressed, with the coxal plates, beyond the 1st segment of mesosome, well defined, laminar. Cephalon subquadrate, with the lateral parts not expanded. Metasome with 3 short segments exposed in front of the terminal one, the 3rd segment being, however, less perfectly defined dorsally. Eyes distinct, lateral. Superior antennæ with the flagellum short, clavate; inferior antennæ with the flagellum more or less elongated and multiarticulate. Mandibles very strong, with the cutting edge divided into 2 superposed dentated lamellæ, molar expansion large and thick. Both pairs of maxillæ of quite normal structure. Maxillipeds with the palp 4-articulate, last joint lamellarly expanded, masticatory lobe well developed, epignath oblong oval, turned in front. Legs of rather uniform structure, ambulatory, and as a rule more strongly built in male than in female, sometimes approaching to a subcheliform character, dactylus in all pairs strong, unguiform, unequally bidentate at the tip. Uropoda terminating in a single flattened joint, and having at the base of this joint, outside, a strong ciliated seta. Male, as a rule, much larger than female.

Remarks.—This is the genus first established, and it accordingly may be regarded as the type of the family. Numerous species have been described by different authors from different parts of the Oceans, but some of these ought certainly to be separated generically, and even in the restriction adopted by Mr.

E. Miers[1]), the genus comprises, in my opinion, forms which can hardly be placed in one and the same genus. As to the Norwegian Idotheæ, they have generally been considered by recent authors as only varieties of one and the same species. A closer examination of the large material at my disposal has, however, shown them in reality to be referable to no less than 6 different species, all easily recognizable in both sexes.

1. Idothea baltica (Pallas).

(Pl. XXXII.)

Oniscus balticus, Pallas, Spic. Zool. Vol. IX, p. 66, Pl. IV, fig. 6.

Syn: *Stenosoma irrorata*, Say.
„ *Idothea tricuspidata*, Desm.
„ — *tridentata*, Rathke.
„ — *irrorata*, Harger.
„ — *marina*, Miers.

Specific Characters.—Body oblong oval, about 3 times as long as it is broad, with the dorsal face perfectly smooth. Coxal plates rather large, occupying the whole length of the side-edges of the segments, so as to form a broad, continuous marginal area. Metasome about the length of the 5 posterior segments combined, terminal segment slightly tapering distally, side-edges straight, tip distinctly tridentate, middle tooth conically produced, lateral ones much shorter, though well defined, and each separated from the median tooth by a well-marked sinus. Eyes of moderate size, rounded. Superior antennæ with the 1st joint of the peduncle rather broad, irregularly angular, last joint much longer than the middle one, flagellum about the length of the former. Inferior antennæ rather elongated, reaching, when reflexed, almost to the end of the 3rd segment of mesosome, flagellum very slender, being much longer than the peduncle, and composed of from 16 to 20 articulations. Legs moderately strong, being, as usual, more powerfully developed in male than in female. Stylet of the 2nd pair of pleopoda in male not extending to the end of the inner plate. Uropoda with the terminal plate obtusely truncated at the tip. Colour extremely variable, sometimes uniformly yellowish or greenish with small dark dots, sometimes variegated, with dark brown pigment forming regular longitudinal bands or larger patches arranged in a perfectly symmetrical manner. Length of adult male reaching to 35 mm.

Remarks.—Mr. E. Miers names this form *Idothea marina,* believing that Linnæus' *Oniscus marinus* refers to this species. This is, however, very doubtful, and as that specific name has been more properly applied to another Isopod,

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[1]) Revision of the Idoteidæ. Linn. Soc. Journal. Zoology, Vol. XVI.

An Account
of
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